

Chemical Week

MAY 7, 1960

Price 50 cents



French chemical industry's future hinges on DeGaulle's political fortunes . . . p. 21

◀ ***Andresen's novel venture-capital plan p. 31***

Asking for new-plant bids?
An organized bid system can save you money. p. 40

Aerosol filling hassle—captive vs. contract loaders—flares anew p. 49

Water-soluble film may be solution to PVA overcapacity problem p. 89



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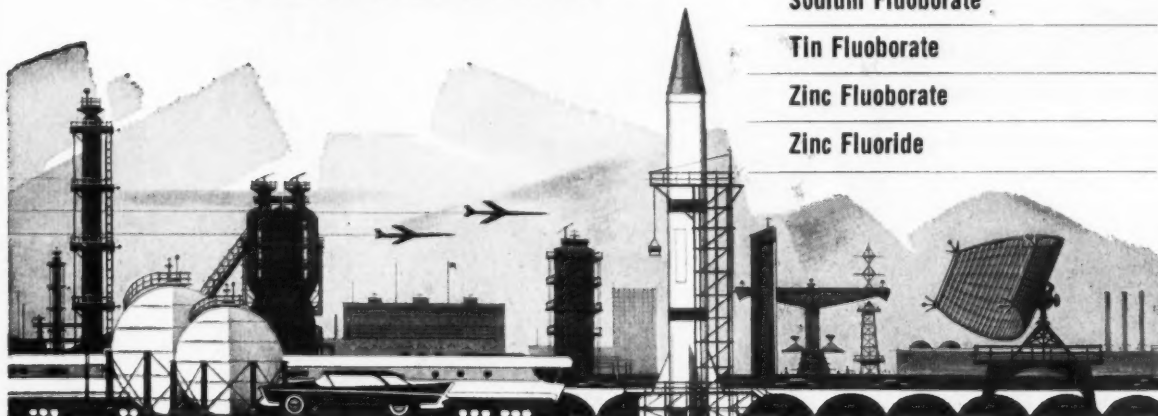
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TOP OF THE WEEK

MAY 7, 1960

- ▶ **The value of compulsory patent licensing** is analyzed by Senate subcommittee in three chemical casesp. 24
- ▶ **Does pressure-vessel safety code need revision?** Increasing use of 3,000 psi. units underscores confusion, controversy ..p. 59
- ▶ **Take another look at India.** It's relaxing foreign-investment barriers, to help expand chemical industryp. 73
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5 MEETINGS

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24 Compulsory patent licensing seems ineffective as antimonopoly device, although it has been useful in three chemical cases.

24 More on first-quarter sales and earnings — chemical firms' gains outnumber setbacks.

24 Still-unexplained methyl acetylene blast at Dow's Freeport plant kills one, injures eight. Equipment loss: \$50,000.

27 WASHINGTON NEWSLETTER

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Investors ready new venture-capital firm to back small companies researching new products.

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44 Fluor shows off new process to remove carbon dioxide from natural gas.

49 SPECIALTIES

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50 Contract fillers comment on how their businesses will be affected by trend to "captive" filling.

56 PRODUCTION

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77 MARKET NEWSLETTER

83 MARKETS

How can statistics used by CPI market researchers be improved? Here are suggestions from several industry groups.

89 SALES

Borden bets that water-soluble packaging films will provide big new markets for PVA resin.

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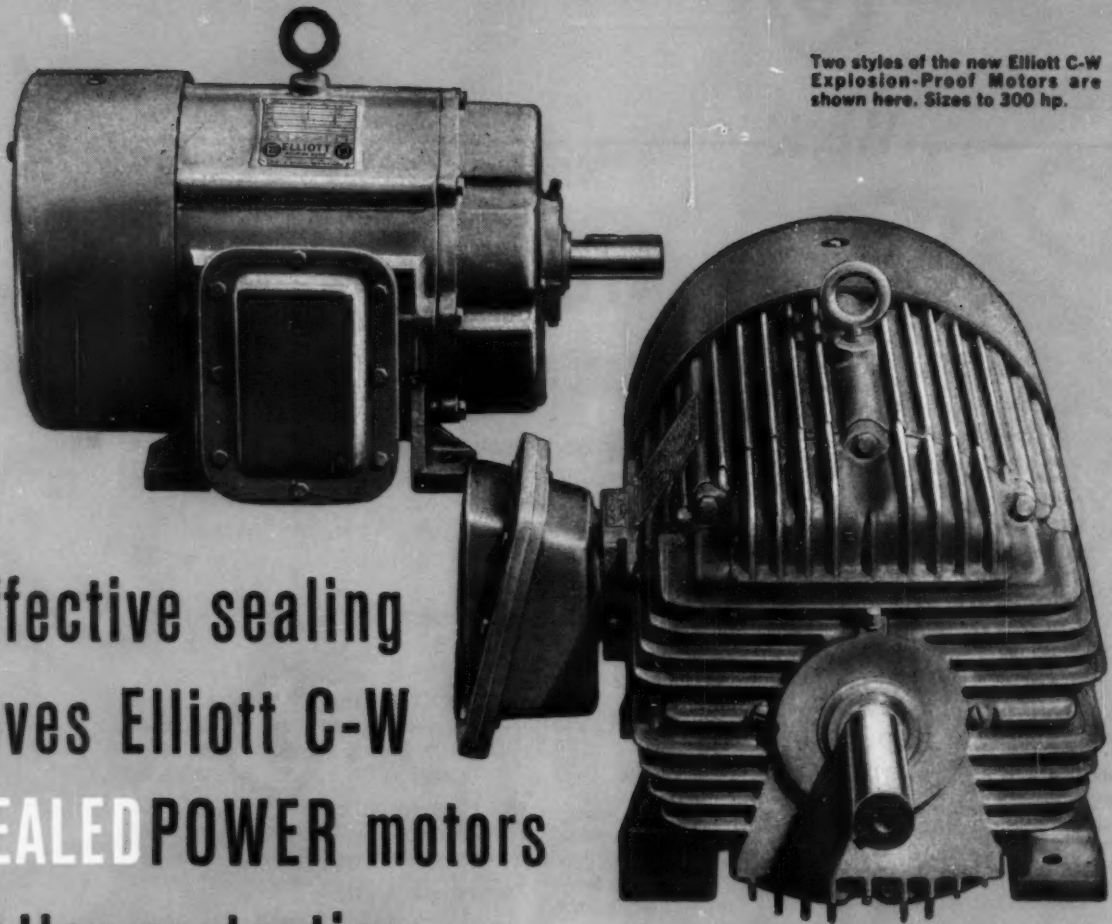
Vol. 86

No. 19

Chemical Week is published weekly and copyrighted © 1960 by McGraw-Hill Publishing Co., Inc. 330 W. 42nd St., New York 36, N. Y. Place of publication: 3rd and Hunting Park Ave., Philadelphia 40, Pa. Second-class postage paid at Philadelphia. Subscription: \$3/year in U.S.A. Send subscription correspondence and change of address to Fulfillment Manager, Chemical Week. Please see page 6 for subscription requirements.

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Two styles of the new Elliott C-W Explosion-Proof Motors are shown here. Sizes to 300 hp.

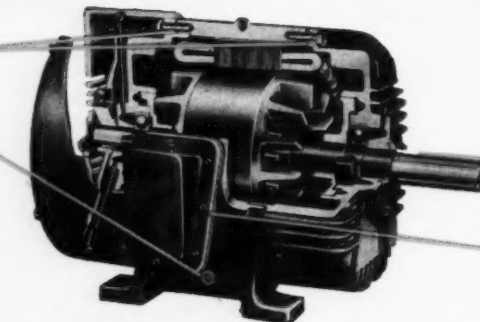


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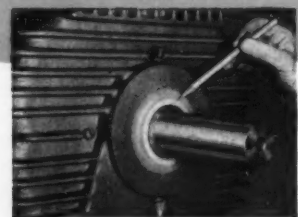
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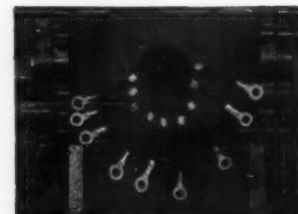


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LETTERS

West Coast Flavors

TO THE EDITOR: We note that in the article on soda pop (*March 26, p. 117*) a number of essential oil and flavor manufacturers are mentioned, all of which are in the New York area.

We believe that it will be of interest to your readers that there is a firm in California supplying the same type of materials.

S. VELASQUEZ
F. Ritter & Co.
Los Angeles

Accurate on Mexico

TO THE EDITOR: We would like to commend your magazine on its excellent reporting on some of the chemical aspects in Mexico—e.g., the hassles in phosphate and citric acid.

As a company dealing in chemicals produced in Mexico, we keep a close check on the Mexican chemical market and any news published in this field. We find your "inside" information accurate and unreported in any Mexican publication.

ERIC SIMON
President
Southern Texas Chemical Corp.
Laredo, Tex.

DeSoto in Aerosols

TO THE EDITOR: We were very much interested in "Pushbutton Paints" (*Feb. 13, p. 67*). It is very interesting and informative, and done in a complete manner that, we found, is characteristic of *CHEMICAL WEEK*.

We should like to add the name of DeSoto Chemical Coatings, Inc., to the list of manufacturers both filling and marketing aerosol coatings. Although we have been supplying paints for aerosol packaging for over 10 years, we have been filling for only about two years. We package under the DeSoto label and also under private-brand labels.

W. F. RHOADES
DeSoto Chemical Coatings, Inc.
Chicago

5-Mil Coating

TO THE EDITOR: In your Technology Newsletter (*March 26, p. 83*) you state that a gallon of heat-resistant polyurethane coating will provide a 50-mil coating on 300 sq.

ft. of surface. One gallon of 100% volumetric solids material will cover 1,604 sq. ft. at 1 mil, or will cover approximately 33 sq. ft. at 50 mils. This heat-resistant material must be a foam at about 10% solids, or you have a misplaced decimal point in your story. Which is correct? Also, is the \$100 per gallon price correct?

C. E. DREW
Fabrics & Finishes Division
E. I. DuPont de Nemours & Co.
Des Moines, Ia.
The \$100/gal. price is correct, but the thickness should have read 5 mils.—ED.

Rules on Scent

TO THE EDITOR: I enjoyed your report (*March 5*) "Scentmakers' Trix Put New Kix in Pix."

In the way of additional comment, you may be interested to know that The American Society of Perfumers devoted its latest monthly meeting . . . to a symposium on Aroma-Rama and Smell-O-Vision. The writer, who has worked with the Mike Todd organization with both the aerosol application and the Smell-O-Vision use of scents, made the following points:

- (1) The fragrances selected should be very familiar to the general audience, such as banana or tobacco.
- (2) The fragrances should be not only true-to-nature but also sufficiently strong.
- (3) The spray time for each fragrance should be a minimum of six seconds.
- (4) The number and type of fragrance should be limited so as not to confuse or repel the audience. A minimum of food or unpleasant scents should be used.
- (5) Fragrance should be considered a secondary supplement much as color has been to movies. The cinema should remain primarily visual entertainment.

R. PANTALEONI
Alpine Aromatics, Inc.
Metuchen, N.J.

Custom Contractor

TO THE EDITOR: The report (*April 9, p. 71*) implying that Carad Chemical Co. (Palo Alto, Calif.) is manufacturing DMSO for sale is inaccurate. Carad is converting Crown Zeller-

bach's dimethyl sulfide to the sulfoxide on a custom-contract basis. C-Z is using this production to supply and develop markets until its 5-million-lbs./year plant at Bogalusa, La., comes onstream in the fall of this year. At the present time, the sole marketing agency in the U.S. for DMSO is C-Z's Chemical Products Division at Camas, Wash.

W. M. HEARON
General Manager
Chemical Products Division
Crown Zellerbach Corp.
Lamas, Wash.

CW said that C-Z "is supplying Carad with dimethyl sulfide . . . and taking the plant's total output."—ED.

Still in Saran

TO THE EDITOR: We have read the article "Polyolefin Fibers Flurry" (*March 26, p. 37*) and we wish to congratulate you on a very clear and informative picture of the polypropylene market, both present and future.

We would, however, like to point out an error as pertains to Dawbarn Bros. While we have discontinued production of nylon, we are still quite active in saran. . . .

ROBERT D. BARTLETT, JR.
Sales Manager
Dawbarn Bros., Inc.
Waynesboro, Va.

MEETINGS

American Institute of Chemists, annual meeting, Radisson Hotel, Minneapolis, May 11-13.

Chemical Market Research Assn., meeting; theme: construction needs plastics may fill; Biltmore Hotel, New York, May 18.

Operations Research Society of America, annual meeting, Statler Hotel, New York, May 19-21.

Technical Assn. of the Pulp & Paper Industry, coating conference, Edgewater Beach Hotel, Chicago, May 23-25.

The Materials Handling Institute, New England show, Commonwealth Armory, Boston, June 6-8.

1960 International Powder Metallurgy Conference, Biltmore Hotel, New York, June 13-15.

American Institute of Chemical Engineers, joint meeting with I.M.I.Q., Del Prado Hotel, Mexico City, Mex., June 19-22.

Parenteral Drug Assn., Edgewater Beach Hotel, Chicago, June 24.

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MAY 7, 1960

Vol. 86, No. 19

Chemical Week (including Chemical Specialties and Chemical Industries) is published weekly by McGraw-Hill Publishing Co., James H. McGraw (1860-1948), founder, EXECUTIVE, EDITORIAL, CIRCULATION and ADVERTISING OFFICES: MCGRAW-HILL BUILDING, 330 West 42nd St., New York 36, N.Y. See panel below for directions regarding subscriptions or change of address. **Officers of the Publications Division:** Nelson L. Bond, president; Shelton Fisher, Wallace F. Tremendy, senior vice-presidents; John R. Callahan, vice-president and editorial director; Joseph H. Allen, vice-president and director of advertising sales; A. R. Venezian, vice-president and circulation coordinator. **Officers of the Corporation:** Donald C. McGraw, president; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, executive vice-presidents; L. Keith Goodrich, vice-president and treasurer; John J. Cooke, secretary.

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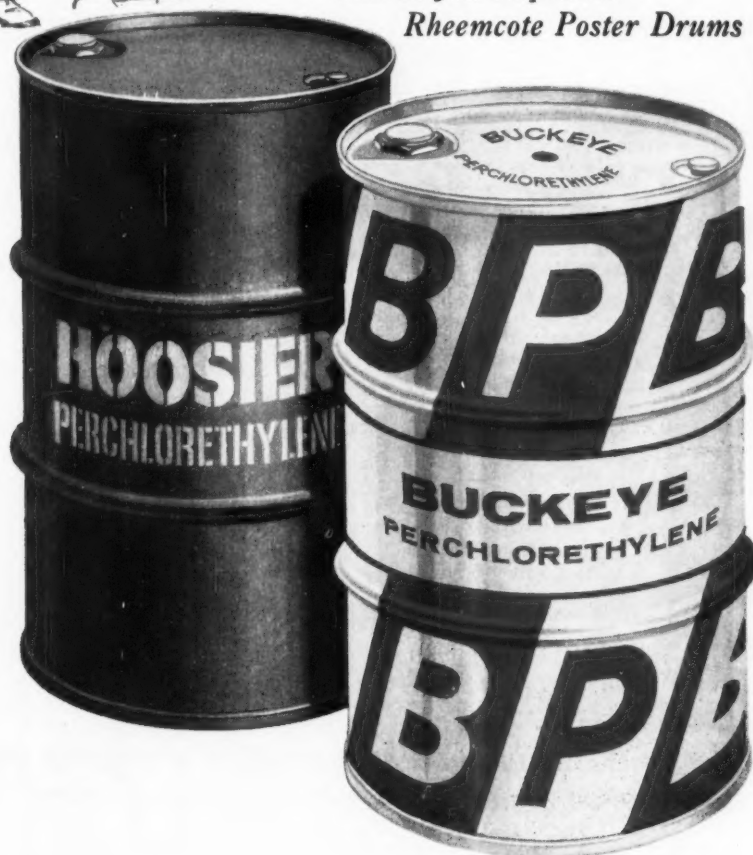
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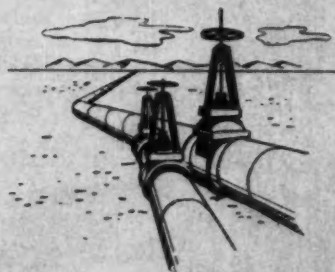
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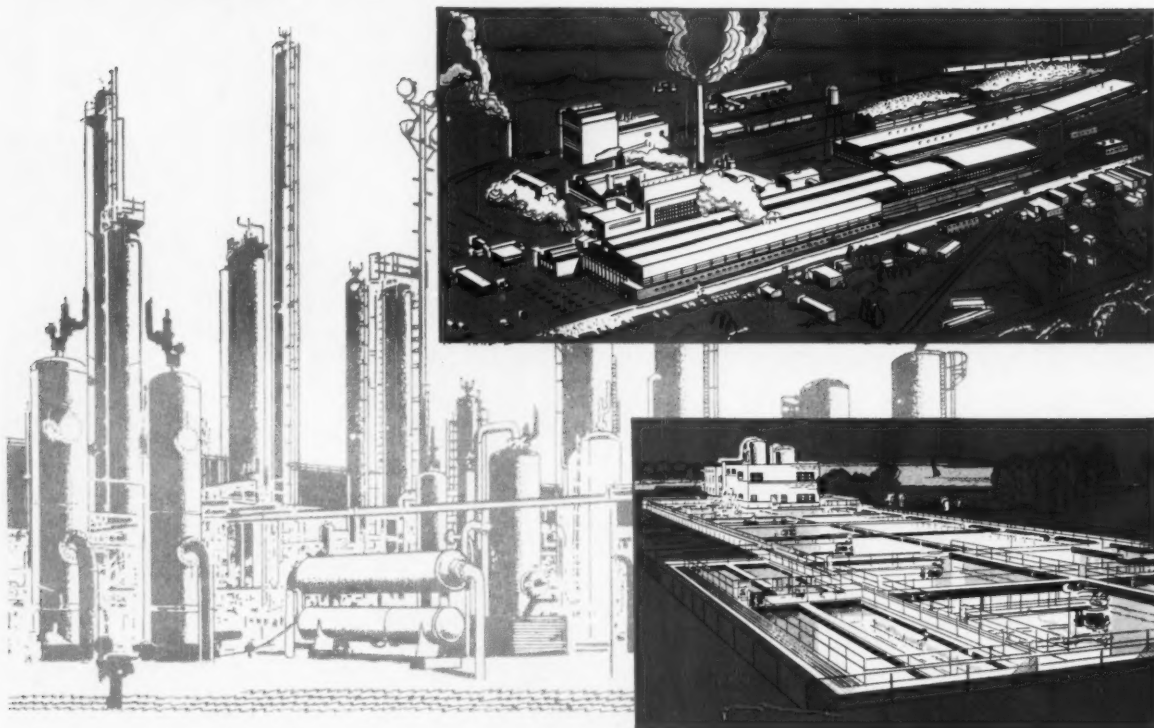
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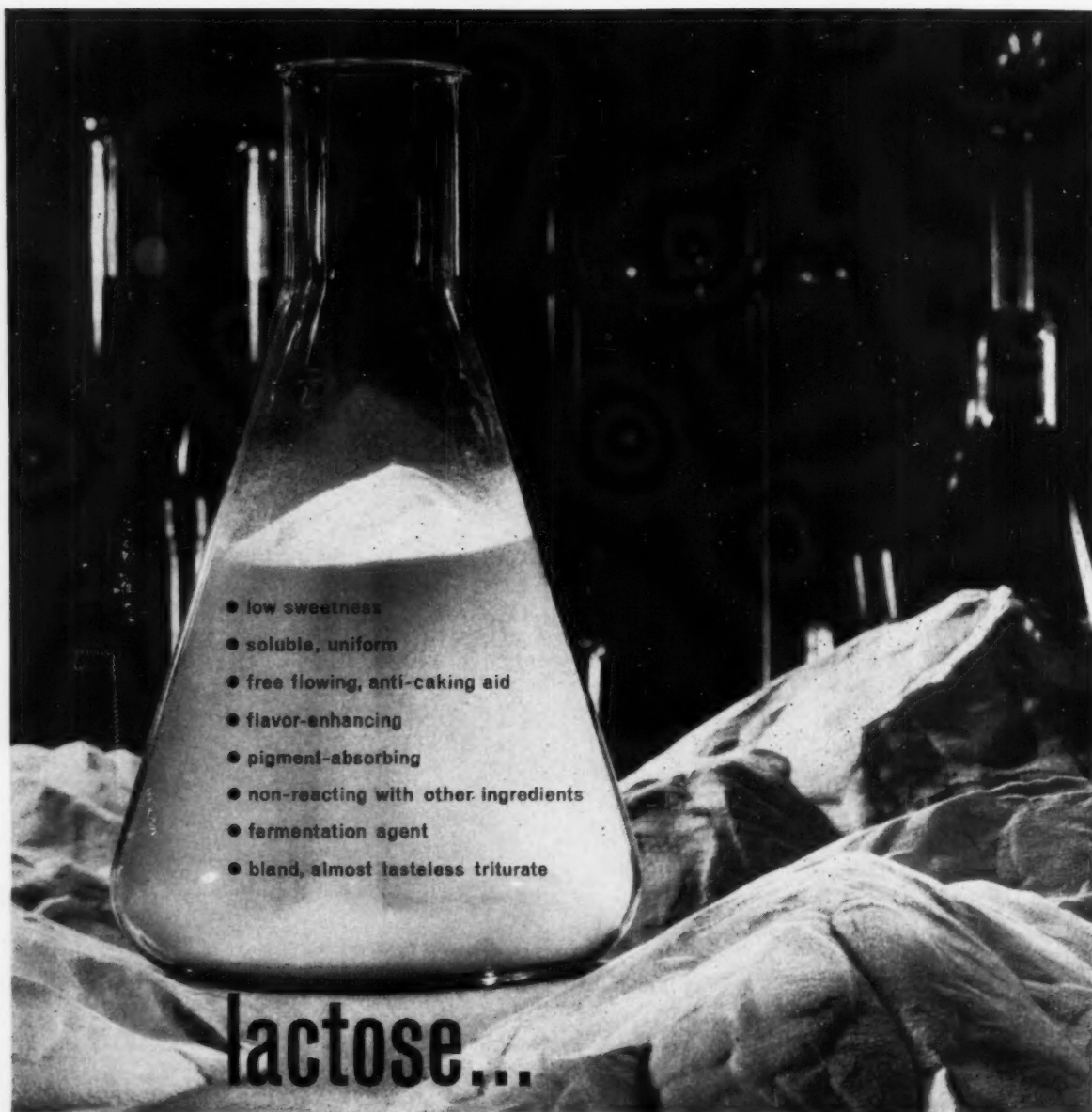
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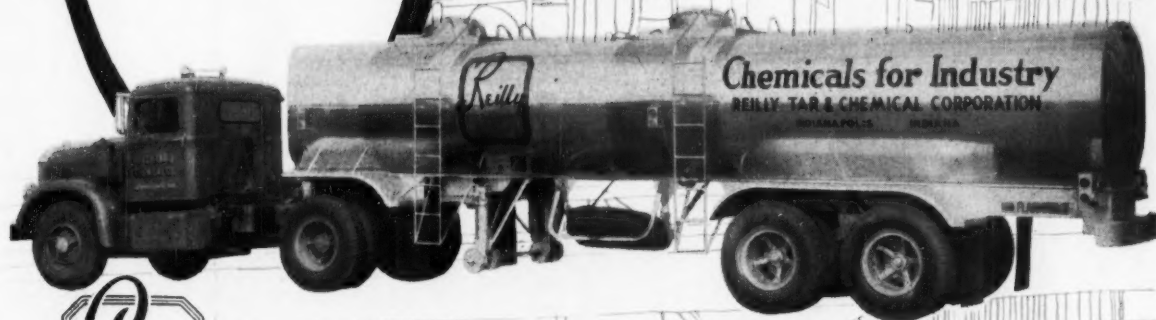
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CHEMICAL WEEK

May 7, 1960

Rexall Drug and Chemical is making its expected big move into petrochemicals. Its \$75-million joint venture with El Paso Natural Gas Co. "will include plants for production of olefins, polyolefins and chemicals" at Odessa, Tex. First plants will produce ethylene, propylene, conventional and high-density polyethylene, and polypropylene, with an onstream target date of early '62.

Initial capacity of the olefin plants: 200 million lbs./year; combined capacities for polyethylene and polypropylene, more than 150 million lbs./year. Ralph Knight, president of Rexall Chemical, will direct polymer and chemical plant operations; El Paso's President C. L. Perkins and Vice-President C. L. Moore will be in charge of the hydrocarbon and olefin-producing plants. (El Paso will provide raw material.)

•
Nopco Chemical is taking a strong step toward vertical integration. The Newark, N.J., company will build a \$7-million, 10-million-lbs./year toluene diisocyanate (TDI) facility at an undisclosed New Jersey site. Nopco bought its "economic and continuous process," will say little more about the process. Bechtel Corp. will design the plant, expected onstream in Jan. '62.

Nopco's new president, G. G. Stier, says the move "opens a whole new field of chemistry for Nopco." Though initial output of the isocyanate plant will be used captively, it can be expanded to 20 million lbs./year, should captive or outside demand—or entry into related products—require it.

By '62, Stier says, demand for polyurethane foams—both rigid and flexible—will be enough to start the plant off at a substantial production level. The company is also planning to expand its foam-making facilities, starting off with a new branch plant in Chattanooga, Tenn.

•
Delhi-Taylor Oil Corp.'s potash reserves will be sold to Texas Gulf Sulphur. Delhi-Taylor will retain a 25% net profit interest and receive a guaranteed advance net profit payment of \$4.5 million over a 4½-year period. D-T has already received \$500,000, with Texas Gulf having until Jan. 1, '61, to complete examination of technical aspects of the two Southeastern Utah potash reserve areas. After that date, commercial development will likely begin, with potash production on the new properties due to start in late '62.

•
J. M. Huber Corp.'s Carbon Black Division currently is enlarging capacity of its Eldon (Baytown), Tex., plant by about 60 million lbs./year. An intermediate superabrasion furnace black unit is due in operation in December; one to produce both fast-extruding furnace black and general-purpose furnace black is set for Jan. '61. Estimated expansion costs: \$2.5 million.

Business Newsletter

(Continued)

Look for new high-energy fuel contracts to be awarded soon.

The U.S. Air Force has been hastening to line up producers for the three components of the Titan missiles' liquid fuel: hydrazine, unsymmetrical dimethyl hydrazine (UDMH), and nitrogen tetroxide.

Olin Mathieson says it's starting engineering studies and land acquisition for construction of a \$15-million anhydrous hydrazine plant near Saltville, Va., where OM produces chlorine, caustic soda and other heavy chemicals (*CW Business Newsletter*, April 30). And it's reported that the Air Force is negotiating for purchase of UDMH from Food Machinery and Chemical Corp. and National Distillers and Chemical Corp. These two concerns have a partnership deal to produce this compound under the tradename Dimazine at the South Charleston, W. Va., plant of FMC's Chlor-Alkali Division.


The nation's two big producers of nitrogen tetroxide are Allied Chemical's Nitrogen Division (at Hopewell, Va.) and Hercules Powder (at Hercules, Calif.). Hercules says it's carrying out a fourfold nitrogen tetroxide capacity expansion, to be completed by this fall.

OM has given the Air Force several proposals for utilizing the \$45-million boron fuels plant now being closed down at Model City, N.Y.—including one proposal for converting the plant to production of UDMH. The congressman from that district—Rep. William Miller (R., N.Y.)—is pressing the Air Force to either convert the big plant, or sell it to private industry.

Progress notes on two proposed mergers:

- Subject to stockholders' approval, Minerals and Chemicals Corp. of America (Menlo Park, N.J.) will merge with Philipp Brothers, Inc. (New York) and the affiliated Philipp Brothers Ore Corp. The merged company—to be known as Minerals & Chemicals-Philipp Brothers, Inc.—would seek to develop "additional opportunities in fields related to ores, metals and minerals in the U.S. and other countries." Combined net worth of the new company would be about \$52 million; combined earnings of the two predecessor companies last year was about \$8.5 million. Philipp Brothers' operations include importing, exporting, processing and wholesaling of metals, ores and chemicals. Minerals & Chemicals produces adsorbents, catalysts, and derivatives of kaolin, bauxite and lime. The proposed merger would not include Philipp Brothers Chemical Co., a separately owned distributor of chemical products.

- Texas Butadiene & Chemical has pulled out of the proposed merger with Industrial Rayon because of the violent opposition by some of IRC's minority stockholders (*CW Business Newsletter*, April 30). Principal sticking point: a threat by some dissidents to demand that IRC redeem their shares in cash if the merger were to go through. IRC's President Hayden Kline says he will press for product diversification and cost-cutting, will look for some other merger or acquisition.



are your
dangerous
products*
safe during
shipment?

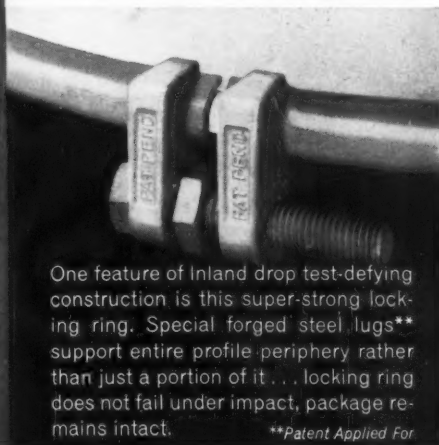
They are if they're shipped in Inland steel drums. Designed for shipper assurance of compliance and safety, Inland open head ICC 17C and 17H drums are manufactured to withstand the punishing drop test with no leakage. Dangerous products can be packaged with more assurance that they will arrive "as shipped" at your customer's plant in this safe, secure drum.

■ Test and compare, as Inland's engineers have... prove for yourself that Inland constantly strives for only the best in steel container construction, interior linings, decorating and all other services that mean extra value to shippers.

* To be in compliance with Interstate Commerce Commission regulations, certain products classified as "dangerous" must be carried in steel drums that, when filled with water, can be dropped 4 feet onto solid concrete, striking diagonally on locking ring, with no leakage. Hydrostatic pressure tests of 15 psi and 30 psi for open head drums ICC 17H and 17C must also be successfully passed.

INLAND STEEL CONTAINER COMPANY

member of the INLAND steel family
6532 South Monard Ave., Chicago 38, Ill.—Plants: Chicago
Jersey City • New Orleans • Cleveland and Greenville, Ohio



One feature of Inland drop test-defying construction is this super-strong locking ring. Special forged steel lugs** support entire profile periphery rather than just a portion of it... locking ring does not fail under impact, package remains intact.

**Patent Applied For



News from

National Carbon Company

Division of Union Carbide Corporation • 270 Park Avenue, New York 17, New York

In Canada: Union Carbide Canada Limited, Toronto

National Carbon Design Engineers expand your engineering force

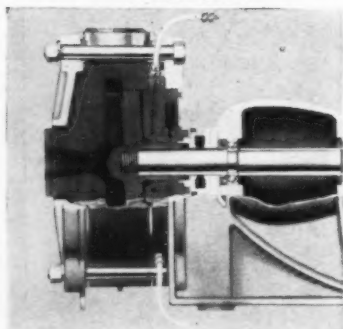


J. A. MRAZ
Design Engineer

Mr. Mraz was graduated from Fenn College in 1953 with a B. S. in Chemical Engineering. He joined National Carbon Company the same year and spent the following two years in the sales engineering department. Here he designed carbon, graphite and "Karbate" impervious graphite chemical process equipment.

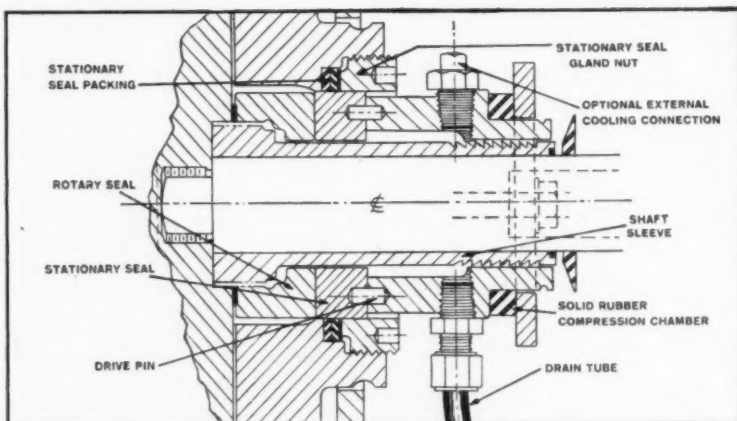
Jim's been specializing, for the past five years, in the thermal design and development of "Karbate" impervious graphite heat transfer equipment.

Seal cooling water connection modified on "Karbate" Model CA centrifugal pumps



This new seal cooling water design offers a stronger connection because it is made through the "Karbate" impervious graphite case cover. This eliminates placing stresses on the plastic water retaining shield which previously held the water connection. With the new arrangement, water flows directly on the rotary seal, thereby assuring complete cooling. Water is drained from the case seal cavity through a drain connection which is attached to the "Karbate" case cover.

REDESIGNED SEAL ARRANGEMENT ON "KARBATE" TYPE F MOTOR-MOUNTED PUMPS IMPROVES OVERALL OPERATION



NATIONAL CARBON presently is supplying the type F centrifugal pump with a new rotary seal arrangement designated as model series FBL which replaces series FAL. The redesigned seal eliminates all but one metal part and provides simple adjustment for stationary seal packing and seal setting. The adjustments can be

performed while the pump is in operation. To provide protection against corrosion, the seal is designed to keep any leakage from contacting metal parts of the pump. If desired, the seal arrangement can be easily adapted for external water cooling. For additional data, write for **Catalog Section S-7253 CJ**.

"Karbate" centrifugal pumps can be belt-driven to obtain high heads and flows

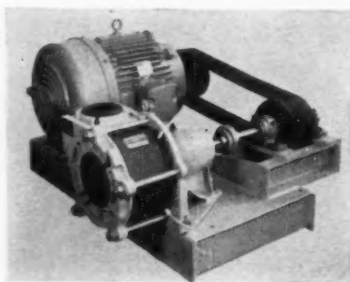


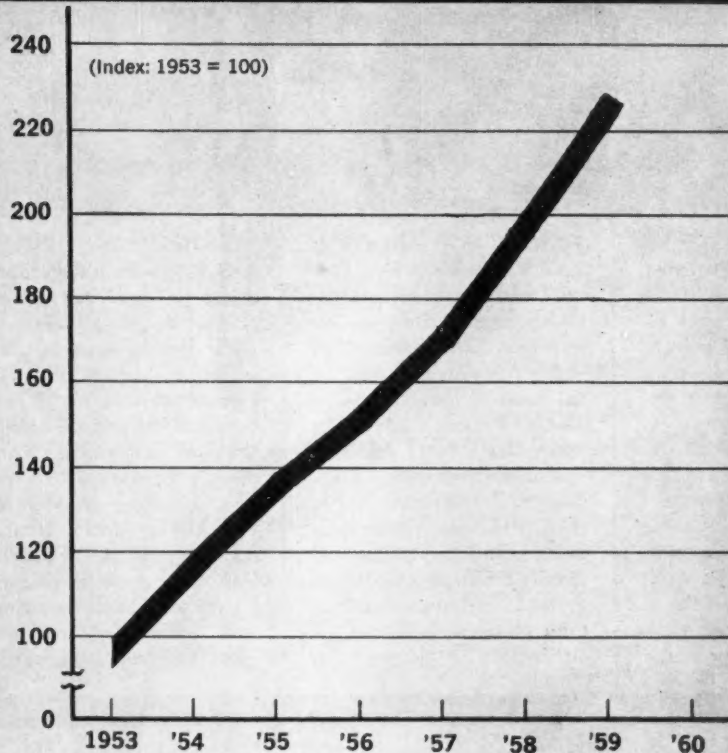
Illustration shows a belt-driven assembly of a "Karbate" type C Model 4CA-10 pump which will handle 1,000 GPM of Cl_2 saturated NaCl brine against a total dynamic head of 120' of brine. The power source is a 60 hp, 1750 rpm motor with a V-belt arrangement which permits operation at 1920 rpm. This is accomplished by utilizing six V-belts on an 11" pitch dia. driver sheave to a 10" pitch dia. pump sheave.

"National", "Union Carbide", "N" and Shield Device and "Karbate" are registered trade-marks for products of

NATIONAL CARBON COMPANY



French Chemical Production: Steeper Gains Under DeGaulle



DeGaulle's regime firmed the French chemical boom. The big question now is, what happens after DeGaulle?

WIDE WORLD PHOTOS

Happy Days for the French

Despite the chaos of French politics since World War II—the fall of more than a dozen heads of government and the collapse of the Fourth Republic—French chemical industry growth has been strong and steady. The upbeat assumed added strength when General Charles DeGaulle came into power two years ago. But for U.S. companies investing in the French chemical industry, an unsettling question clouds the landscape: Will this growth continue if political turmoil returns?

Critical national problems (e.g., Algeria) remain and, until they are laid to rest, no leader—not even De Gaulle—can consider himself secure.

But today, it's hard to find anyone in the French chemical industry who is worried about business. Last year,

the industry's output jumped 14%, sales boomed to \$3.5 billion. Exports tallied \$426 million, up more than 25% from '58.

By the end of last year, production of many chemicals had already surpassed the '61 goals of the Third Modernization and Equipment Plan; industry and government planners have had to boost the targets at least 15% for most inorganics, much more for organics.

At the end of World War II, the French chemical industry was crippled and outdated. From less than 40 in '45, the over-all index of chemical production (1952=100) climbed to 82 in '49, 150 in '55, and over 200 last year. Output of sulfuric acid reached 1.8 million metric tons last year—52% more than in '52. Calcium

carbide was up 52%, to 344,000 tons; caustic soda, 18%, to 750,000 tons. And a host of new products have been introduced since '45.

Today France ranks as the world's fifth largest (after the U.S., Russia, West Germany and Great Britain) chemicals producer and fourth (ahead of Russia) largest exporter. The French chemical industry employs 230,000, invests some \$200 million/year—6% of sales—in capital projects.

Lure for Yankees: Numerous U.S. chemical companies, rushing to set up inside the "Common Market," are putting their money into France. Among U.S. producers which last year launched new projects in France, or expanded old ones: Godfrey L. Cabot, Continental Carbon, United

The French Chemical Industry's Big Four



RAOUL de VITRY d'AVAU-COURT, president of Pechiney since 1936, chairman since '58, had a big hand in developing West African aluminum production, helped plot the Fifth Republic's economic reforms. Pechiney's '59 sales: \$152.4 million, not counting excise taxes. Products: aluminum (58% of sales); rare metals; nuclear materials; electro-metallurgical products; derivatives of sodium, ammonia, aluminum, sulfur, copper, fluorine; minerals.



ARNAUD DE VOGUE has been St. Gobain's chairman and president since 1952. He sparked St. Gobain's entry into U.S. glass market, and with Managing Director Rene Grandgeorge is responsible for company's expansion surge since '52. St. Gobain's '59 sales (including wholly owned subsidiaries): \$181.8 million, not counting excise taxes. Products: glass (about half company's activity); sulfuric acid; fertilizers; acids; basic inorganics; plastics; paper nuclear products.



MARCEL BO, chairman of Rhone-Poulenc, has been with company since 1918, is highly research conscious. He is firmly convinced the key to his company's success lies in radically new products. Rhone-Poulenc's '59 sales (including two affiliates, Specia and Prolabo): \$170.7 million, counting excise taxes. Products: pharmaceuticals, (35%); plastics and synthetic textiles (30%); industrial chemicals, agricultural products, perfumes fill out its line.



JEAN-JACQUES DESPORTES, head man at Kuhlmann, shuns publicity but is considered one of the industry's most talented executives. He joined Kuhlmann in 1945, became director in '57, has concentrated on diversification in chemicals. Kuhlmann's '59 sales: \$109.1 million, including excise taxes. Principal products: fertilizers; heavy chemicals. Its affiliates make dyestuffs (biggest French producer); methanol; oxo alcohol; ethylene and propylene oxides; plastics.

Carbon, Corn Products, Dow, Du Pont, Firestone, Wyeth.

This injection of new blood and technology is one way the Common Market is helping to change the shape of the French chemical industry.

More important are the realignments within the domestic industry itself, as it readies for bigger markets and competition from its Common Market partners.

One of the most striking features of the French industry is its fragmentation into hundreds of small enterprises, each with a tiny share of the market. While the 10 leading French companies account for only 25% of total industry sales, West Germany's big three do one-third of that nation's chemical business. In Italy Montecatini alone grosses half of the total.

Actually, much of this fragmentation is a matter of accounting. The big companies don't consolidate the sales of their numerous specialized affiliates. If Pechiney had lumped in

the sales of its affiliates, sales in '59 would have totaled more than \$300 million, instead of the \$153 million actually listed. Kuhlmann's '59 sales would have been about \$202 million, if consolidated.

But the industry must concentrate further if it is to meet the competition that will intensify as tariff walls drop within the Common Market. Some of this concentration is simply a matter of tightening up corporate structures. Recently, for example, Pechiney absorbed two of its affiliates, Terres Rares and Ribecourt, and Kuhlmann swallowed its affiliate, Coignet.

Growing Web: The drive for larger-scale operations and "rationalization"—cutting costs by promoting efficiency—has also prompted a rash of joint-ventures during the past few years. These joint enterprises are gradually building a complicated web of relationships between the various parent producers.

Pechiney, Rhone-Poulenc, Kuhl-

mann, and Ugine, with oil and rubber companies, set up SOCABU to make butyl rubber. Pechiney, Rhone-Poulenc, and Ugine—along with St. Gobain—are also linked through a joint subsidiary, Societe des Resines Fluorees, to produce tetrafluoroethylene. And Pechiney and St. Gobain are also partners in Produits du Titane, titanium oxide producer.

More involved is St. Gobain's stake in France's first GRS rubber plant, due to start up next year. St. Gobain is involved through Shell-St. Gobain, the company it owns jointly with Royal Dutch Shell. Shell-St. Gobain, in turn, is a partner in the rubber project with Michelin, Godfrey L. Cabot, and Cabot's affiliate, Texas Butadiene.

In a logical culmination of this trend, Pechiney and St. Gobain last year set up the biggest joint venture of them all, Produits Chimiques Pechiney-St. Gobain. The new company—whose sales are estimated at \$140-160 million for this year—

merges most of the two companies' domestic chemical activities, excluding St. Gobain's soda operations and both companies' petrochemicals.

Petrochemical Partners: The most striking trend in Europe's chemical growth is petrochemical development. Between '59 and '61, the French plan to spend some \$225 million on petrochemical investments, boosting output by 250,000 tons (carbon content).

France's raw-material position will be dominant in the Common Market. Plans to bring natural gas from the fabulous Hassi R'Mel field in the Sahara to the Mediterranean are beginning to take shape. A pipeline to Algerian ports has been started, and a liquefaction plant is blueprinted. Sahara oil already is feeding French refineries.

The Sahara output will be more than France alone can handle, so French petrochemical producers won't have a corner on this raw-material source.

But they will gain an important advantage from the fabulous Lacq natural gas field in southwest France. Sulfur scrubbed from the gas will eventually amount to 1.25 million tons/year, making France the world's second (after the U.S.) largest producer.

The petrochemical complex now going up in the Lacq field is the most dramatic example of how French companies are joining forces. Five jointly owned companies are now building plants for producing eight products. They are due to go on-stream gradually, from the end of '60 through '61. The complex will have a total capacity larger than that of any single French company.

Key company of the complex is Aquitaine Chimie, which is owned by Pechiney, St. Gobain, Pierrefitte, Office National Industriel de l'Azote (ONIA), and a bank. It will produce 25,000 metric tons/year of acetylene and 70,000 tons/year of ammonia. The ammonia will go to Azolac (ONIA and Pierrefitte), which will make nitric acid and nitrogenous fertilizers. The acetylene will go to Acetalacq (Pechiney, St. Gobain, Pierrefitte, Rhone-Poulenc, and Melle) for 100 tons/day of acetaldehyde; and to Vinylacq (Pechiney, St. Gobain, and a bank) for some 70 metric tons/day of vinyl chloride. Melle is building a plant to produce 30-50

tons/day of butanol from the acetaldehyde. And Methanolacq (Aquitainechimie and Kuhlmann) will produce some 100 tons/day of methanol.

Storms Ahead: France's chemical industry, stronger than it has ever been, seems to have all it needs to maintain its dynamic growth. But on the wider horizon of French national life and international relations, there are clouds that could spell stormy days ahead for the nation, including the chemical industry.

Economically, France is in good shape. The DeGaulle government's stabilization program has stemmed the deadly drain on foreign reserves, which had brought the country to the edge of bankruptcy two years ago. It has slowed (but not stopped) inflation, and put economic expansion on a more solid footing.

Politically, the picture is more grim. Settlement of the Algerian war still seems remote, and there is increasing disenchantment with DeGaulle, the man who once seemed destined to end that costly strife. As his political opposition grows, DeGaulle will find it harder to deal with such problems as the mounting discontent of the farmers, and to maintain the economic discipline necessary to contain inflation.

Moreover, the French economy cannot continue to bear the drain of the Algerian war (estimated at \$1-2 billion/year) indefinitely without again getting into foreign exchange trouble, which—compounded by inflation—could crimp industrial expansion. The expenses of DeGaulle's nuclear adventures won't help the economy, either.

French industry leaders don't seem troubled by such considerations. Although they may not expect this period of relative political calm to last much longer, they are still optimistic about what lies ahead for business. They can point to the fact that, despite the political upheavals of the Fourth Republic, industry—especially the chemical industry—flourished.

The fact is, however, that two years ago the French business community was worrying about a recession if the foreign exchange crises were not halted, and it took DeGaulle's overriding influence to halt it.

One knowledgeable and optimistic observer points out that Europe's industrial future must be considered on

a continental, rather than a national, basis; and that the need to live in a larger market, such as the Common Market, is a more important factor than national ups and downs.

It's not certain that, if France again slips into political and economic chaos, its economy will be able to hold up under competition from its Common Market neighbors. The French chemical industry is betting that it will. By backing up its faith with mounting investments, it is increasing the chances that this optimism will be justified.

New Polyolefin Plunge

Coming in polyolefins: a new polyethylene process and a new producer—Foster Grant Co. (Leominster, Mass.) The New England firm, which began as a plastics molder and now is producing four major plastic resins, will utilize a process brand new to this country—the Agfo process for conventional polyethylene.

Developed by Imhico A.G. (Switzerland), Agfo is described as a continuous high-pressure polymerization process that can make reproducible products over a broad range of density, melt index, and other properties.

It's "highly instrumented," according to its backers, and makes for plants with "low capital investment and simplicity of operation." Only other known Agfo process plant is one now going up in the U.S.S.R.

Scientific Design (New York)—which will engineer, design and construct the new Foster Grant plant—says the process lends itself to Scientific Design's "package concept," which is considered advantageous to an independent company.

Only a First Step: Foster Grant's long-range plans in polyolefins, however, go beyond high-pressure polyethylene. The company says it's considering polymerization and copolymerization of propylene, butylene and other hydrocarbons.

Meanwhile, F-G officials insist they haven't yet decided on a site for the polyethylene plant, and capacity is not disclosed. But trade sources speculate that it may go up near the company's styrene monomer facilities at Baton Rouge, La. Decision on a site, however, is expected within 60 days, or following the return of company President Joseph Foster from Europe.

Trustbusting Tactics

Compulsory licensing of patents is not effective in breaking up monopolies, according to staff experts of the Senate's subcommittee on patents. As sharper tools for such a job, these lawyers suggest divestiture of patent rights, or limited injunctions against enforcement of misused patents.

The subcommittee staff reported last week on its study of 81 antitrust cases filed since 1941—when the Dept. of Justice began putting heavy stress on patent licensing.

Compulsory licensing was found to be useful for "trustbusting" in only eight of the cases studied. Three of these were in the chemical process field.

As a result of a '52 decree, Du Pont issued 264 licenses and Imperial Chemical Industries 11—including nine in the field of polyethylene. "The judgment appears to have made it possible for a substantial number of companies to enter this field," the staff concluded.

Under a '54 decree, Merck granted certain royalty-free patent rights to 10 companies—only one of which materially benefited from the license.

Eastman issued 43 licenses to film processors in the three years following a '54 consent decree; and the staff found that this created "some competition."

The probers warned against reciprocal licensing as an antimonopoly move against a company that is dominant in its field. Under such a provision, they say, the defendant may gain more knowledge than he gives up.

Texas Plant Blast

Dow Chemical's Texas Division officials are trying to find out what caused a 4-ft. tank of methyl acetylene—a component of certain rocket fuels—to explode while it was being filled last week at Dow's Freeport plant.

The explosion triggered a bigger blast in the 6x15-ft. storage tank from which the smaller tank was being filled, and this was followed by a fire that lasted about 1½ hours. The employee who was filling the smaller tank was killed; eight others in the area were injured (none seriously). Total property damage was estimated at \$50,000.

First-Quarter Financial Wrap-up

CHEMICAL	SALES		EARNINGS		
	1st qtr. 1960*	Change from 1st qtr. '59	1st qtr. 1960*	Change from 1st qtr. '59	Profit/ Sales Ratio
Air Reduction	53.3	Up 11.1%	4.2	Up 10.9%	7.8%
Atlas Powder	16.6	Up 4.0%	0.7	Down 7.0%	4.0%
Catalin Corp.	5.3	Down 7.3%	—0.02	(Net loss)	—
Celanese Corp.	66.7	Up 13.3%	4.8	Down 1.0%	7.3%
Commercial Solvents	16.2	Up 2.7%	1.1	Up 40% ⁽²⁾	7.0%
Diamond Alkali	33.0	Up 9.3%	2.9	Up 34.9%	8.7%
Foote Mineral	5.2	Down 27.6% ⁽¹⁾	0.3	Down 64.4%	4.8%
Freeport Sulphur	(Not Reported)		3.1	Up 6.1%	—
Harshaw Chemical	19.5	Up 8.1%	0.5 ⁽²⁾	Down 1.9%	2.4%
Heyden Newport	15.0	Up 9.7%	0.9	Up 36.8%	5.9%
Koppers Co.	67.2	Up 28.5%	1.8	Up 54.6%	2.6%
Mallinckrodt	9.5	Up 15.6%	0.3	Up 32.4%	3.3%
Metal & Thermit	10.0	Up 1.9%	0.3	Up 5.4%	2.7%
Michigan Chemical	1.8	Down 12.7%	—0.06	(Net loss)	—
Montrose Chemical ⁽³⁾	0.9	Up 13.4%	0.2	Up 22.0%	16.3%
Nalco Chemical	12.5	Up 5.7%	1.1	Up 13.7%	9.1%
Nat'l. Starch & Chem.	13.4	Up 8.5%	0.8	Up 9.6%	5.6%
Nopco Chemical	10.1	— ⁽⁴⁾	0.4	— ⁽⁴⁾	4.1%
Pan American Sulphur	(Not Reported) ⁽⁵⁾		0.9	Up 15.1%	—
Pennsalt Chemicals	22.0	Up 4.9%	1.3	Up 4.3%	5.8%
Pitt. Coke & Chem.	15.9	Up 2.1%	0.7	Down 0.9%	4.2%
Reichhold Chemicals	23.8	Up 6.4%	0.6 ⁽²⁾	Up 39.0%	2.7%
Spencer Chemical	11.4	Down 8.6%	0.4	Down 51.4%	3.6%
Stauffer Chemical	53.2	Up 0.6%	5.0	Up 1.9%	9.5%
Texas Gulf Sulphur	13.1	Down 6.6%	2.7	Down 16.6%	20.7%
Witco Chemical ⁽⁶⁾	15.2	Up 18.3%	0.6	Up 27.9%	3.8%
Wyandotte Chemicals	22.3	Up 13.8%	0.8	Up 3.5%	3.5%
PHARMACEUTICAL					
Abbott Laboratories	36.3	Up 9.0%	4.5	Up 8.9%	12.4%
Baxter Laboratories	(Not Reported)		0.6	Up 45.2%	—
Lilly, Eli	49.2 ⁽⁷⁾	Up 2.3%	6.8 ⁽⁷⁾	Up 0.7%	13.8%
Merck & Co.	55.8	Down 0.5%	7.4	Down 5.5%	13.3%
Parke, Davis	53.4	Up 19.1%	9.6	Up 38.4%	17.9%
Pfizer, Chas.	68.7	Up 13.5%	7.1	Up 12.0%	10.3%
Plough, Inc.	9.5	Up 18.8%	0.7	Up 16.9%	7.3%
Searle, G. D.	9.1	Up 12.8%	1.9	Up 12.8%	21.4%
Smith Kline & French	35.8	Up 10.2%	5.9	Down 3.4%	16.4%
U.S. Vitamin & Pharm.	3.3	Down 6.8%	0.4	Down 12.9%	11.9%
Upjohn Co.	39.6	Up 7.8%	5.9	Up 16.2%	14.8%
Warner-Lambert	50.8	Up 17.0%	4.0	Up 15.7%	7.8%
OTHER CPI					
Beryllium Corp.	5.8	Up 16.4%	0.4	Up 0.3%	6.1%
Brush Beryllium	6.9	Up 65.6%	0.6	Up 41.3%	8.3%
Detrex Chemical	4.8	Up 12.7%	0.2	Down 5.5%	4.9%
Eastman Kodak ⁽⁸⁾	195.4	Up 3.0%	24.2	Up 5.9%	12.4%
Nat'l. Dist. & Chem.	134.3	Up 4.9%	6.0	Up 0.3%	4.5%
National Lead	132.6	Up 8.5%	12.1	Up 2.8%	9.1%
Pitt. Plate Glass ⁽⁹⁾	158.2	Up 43.5%	12.1	Up 225.6%	7.7%
Rayonier	34.1	Up 6.1%	2.6	Down 13.0%	7.7%
Rexall Drug	56.5	Up 17.5%	1.6	Up 12.2%	2.9%
Thiokol Chemical ⁽¹⁰⁾	42.0	Up 20.2%	0.8	Down 37.5%	1.9%

* Dollar figures in millions.

(1) Down 27.6% from year-ago period's total sales, which included \$2.6 million in sales of lithium hydroxide to U.S. Atomic Energy Commission under a contract that was not renewed. Excluding sales to AEC, company's first-quarter sales were up by 12.8%.

(2) Exclusive of nonrecurring gains or losses.

(3) For three-month period ended Feb. 29.

(4) First-quarter data for 1959 and '60 not comparable because of company's acquisition of Jacques Wolf & Co. (Clifton, N.J.) on May 1, '59.

(5) Shipments of sulfur up by 30.6%, to 250,848 long tons.

(6) Operating data now include, for the first time, results for company's wholly owned subsidiary in United Kingdom, Witco Chemical Co. Ltd.

(7) Estimated by company.

(8) For 12-week period ended March 20.

(9) First-quarter '59 results were substantially affected by strikes.

(10) Substantial portion of sales increase represents reimbursement for costs in excess of original estimates under cost-plus-fixed-fee contracts; reimbursement did not add to profits.

COMPANIES

Gutta Percha and Rubber, Ltd. (Toronto, Ont.), is being voluntarily liquidated and an "unnamed" Canadian rubber manufacturer is reported to have taken over all equipment. The company, formed in 1883, and once Canada's largest rubber manufacturer, was hit by competition from U.S. firms following World War I and ended manufacture of car and truck tires in '50. Officials said loss of export markets and lack of tariff protection were chief causes of failure.

Harvey Aluminum, Inc. (Torrance, Calif.), producer of both primary and fabricated aluminum products, has registered with the Securities and Exchange Commission to offer 750,000 shares of class A common stock for public sale. Purpose of the offering: construction and acquisition. Expenditures for '60 are pegged at \$12.6 million.

Ekco Products Co. (Canada), Ltd., has acquired the silicone glazing division of Capital Plating Works, Edmonton, Alta. Price was not disclosed.

Rubber Corp. of America (Hicksville, N.Y.) now is controlled by a Swiss group headed by Oerlikon-Buehler, manufacturer of machine tools. Oerlikon, which also has a strong interest in Dynamit A.G. (Troisdorf, Germany), producer of chemicals and plastics, said that Dynamit's technical know-how would be made available to Rubber Corp. through the Swiss group—with plans for immediate expansion and increased activities.

EXPANSION

Gypsum Wallboard: Allied Chemical's Barrett Division will build a new gypsum wallboard plant adjacent to its General Chemical Division Works at Claymont, Del. Set for late-'61 completion, the plant will use a new chemical process to obtain gypsum, will be rated to "turn out enough to fit the needs of 30,000 new homes/year," according to H. Dorn Stewart, Barrett president. Developed by Barrett's research department, inplant production will eliminate cost of transporting the mineral from far-off rock sources.

Soda Ash: Chlor-Alkali Division of Food Machinery and Chemical Corp. is expanding soda ash facilities at Green River, Wyo., raising total annual capacity from 550,000 to 750,000 tons/year. First phase of construction is to be completed by early '61, the second by early '62.

Petrochemicals: Diamond Alkali (Cleveland) is planning to spend \$30-35 million in the next two years for additional PVC resin capacity, PVC monomer facilities, and expansion and extension of the company's

organics business. Project in the works: production of acetylene by partial oxidation of natural gas.

Limestone: Basic Chemicals Co. (Glenwood Springs, Colo.) will expand its limestone processing plant this summer to 100 tons/day from the present 20 tons/day.

Resins: Colton Chemical Co. (Cleveland), a division of Air Reduction Co., will expand its polyvinyl acetate resin and copolymer emulsion facilities for paint, adhesives and paper coatings products on the West Coast. A plant will be built at City of Industry, Los Angeles County, Calif., close to a major liquid air-separation unit operated by Airco's Air Reduction Pacific Co. division. Completion is set for later this year.

FOREIGN

Chemicals/Lebanon: Olin Mathieson is establishing a Middle East company in Beirut, Lebanon, to develop corporate interests in that area, India and Africa.

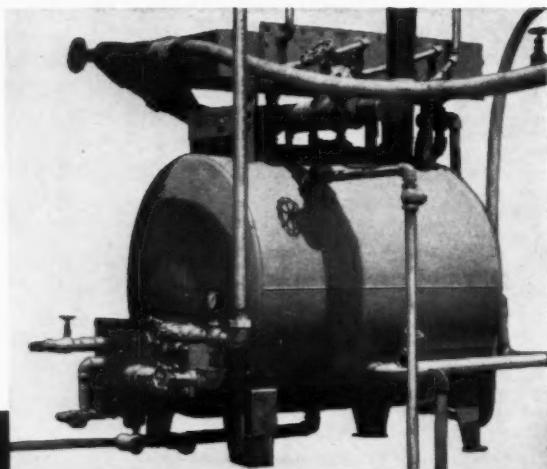
Fluorocarbons/Australia: Australian Cream Tartar Co. Pty. Ltd., partly owned by Stauffer Chemical, has joined the Ugine group of France in creation of Pacific Chemical Industries Pty. Ltd. To be built: a \$2-million fluorocarbons plant, using the Ugine fluorocarbon process and Stauffer's hydrofluoric acid process. Production target: early '61.

Pharmaceuticals/Egypt: The Arab Pharmaceuticals Co. (Cairo), under license from a group of Hungarian plants represented by the state organization Medinpex, will begin manufacture of drug products under original Hungarian names next December. The APCO plant is under construction at Koubba, near Cairo.

Fertilizers, Plastics/Hungary: Hungary's second five-year plan will aim to double the value of its chemical industry's output, with two-thirds of the investments used for increasing production of fertilizers, plastics and synthetic fibers. In nitrogenous fertilizers, the Tiszapalkonya plant will be expanded by 100,000 metric tons/year; the Kazincbarcika plant will be doubled in size and its process switched from coke to natural gas. Also planned: a 300,000-metric-tons/year superphosphate plant as a division of the Tiszapalkonya combine, and two new 100,000-metric-tons/year sulfuric acid facilities. Plastics and fibers projects: Borsod Chemical Combine will put up a 15,000-tons/year PVC plant; a 10,000-tons/year polyethylene facility is slated for the Tiszavidek Chemical Enterprise.

Exports/East Germany: Leuna Works' exports for first-quarter '60 are up 7.2% over the same quarter last year, with ammonium sulfate fertilizers heading the export list for Pakistan, India and England. Last year, Leuna exports—including fertilizers, fuels and semifinished chemical products—rose 20%.

A new and better Tank Cleaning Process by



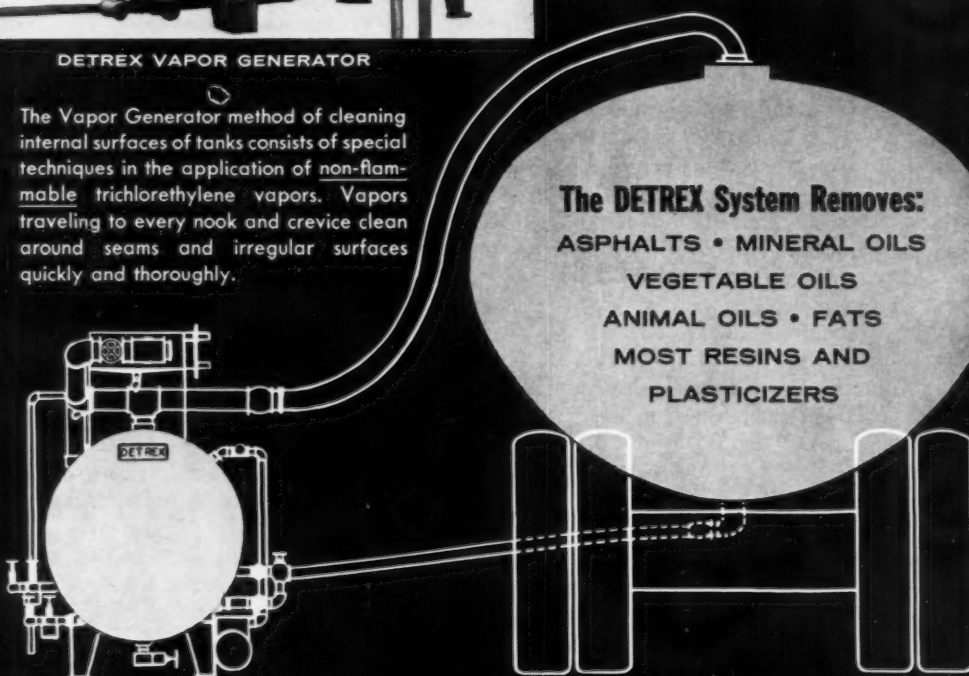
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Washington

Newsletter

CHEMICAL WEEK

May 7, 1960

Stumbling blocks to increased export of industrial chemicals will be pinpointed by chemical companies in the next few weeks for the benefit of tariff negotiators and Commerce Dept. officials trying to promote exports.

A dozen companies are putting together field reports on troubles met by specific products in specific countries. The need for detailed information became clear last week when company representatives met in Washington with Commerce officials to discuss ways to increase industrial chemical exports—which now amount to \$250 million annually.

Congress and industry both show considerable skepticism about the effectiveness of the Administration's big export drive. Critics charge that the Administration exhorts industrial firms to export but provides few incentives.

Major feature of the Administration's program is short-term insurance against political risks such as revolution, expropriation or monetary changes. Some exporters complain this has only minor value, applies only to unstable countries, does little to open up markets in Europe or Latin America.

The big drive centers in Congress. The Senate Commerce Committee has been holding hearings, and appears interested in extending insurance to normal commercial losses (such as nonpayment) as well as political ones. Administration officials staunchly defend the President's program, but the Democrats have won important support from Henry Kearns, former Asst. Secy. of Commerce who helped develop the Administration program. He now calls it "inadequate." (Note: Kearns is close to Vice-President Nixon, has been mentioned as a possible Commerce Secretary in a Nixon administration.) A coalition of Democrats and Nixon Republicans could push through a broader export insurance program.

The need to break down tariff and monetary barriers in Latin America was agreed upon by CPI spokesmen meeting with Commerce Dept. officials. All companies seem to be having trouble getting licenses to operate in Mexico, apparently because of its desire to foster local industries. Increased barter between Latin-American and Iron Curtain countries also worries exporters.

Possible tariff problems with the "Common Market" loom large. As an indication, spokesmen cite Belgium's recent imposition of a 12% tariff on organic pigments.

Companies represented at the meeting, in addition to the Manufacturing Chemists' Assn., were Hooker, Du Pont, Monsanto, American Cyanamid, Wyandotte, Foote Mineral, Pennsalt, Harshaw, American Potash & Chemical, Allied Chemical and Jefferson Chemical.

Washington Newsletter

(Continued)

White House conferences on labor-management relations are expected to get rolling before the end of May. The conferences, held on an industry-by-industry basis, will seek areas of agreement on management incentives, productivity, foreign competition, maintaining industrial peace and price stability. No bargaining topics will be on the agenda.

The meetings were suggested by Labor Secy. Mitchell to AFL-CIO President George Meany, who quickly agreed. Three top labor leaders and three business executives will be named to work out ground rules.

•
"Controversial" advertising by military contractors would be severely censored by proposed new regulations of the Defense Dept. The proposed rules have kicked up a real rumpus.

They would go far beyond current security restrictions and bar "inappropriate claims" about new weapons, discussion of the economic impact of contract awards or cutbacks, discussion of relative merits of conflicting military strategy that might affect contracting.

The move is sparked by President Eisenhower's press conference attack on the "munitions lobby" and the Hébert committee's (House Armed Services) recommendations that the Pentagon clamp down. But Rep. John Moss (D., Calif.), chairman of the House Government Information Subcommittee, cries "censorship." He says it would give Asst. Defense Secy. Murray Snyder, already a favorite target for censorship-conscious newsmen, the powers of an "advertising czar."

•
A proposal to keep medical disputes out of politics has been made by Pfizer to the Kefauver committee investigating drugs. Pfizer's suggestion came after doctors got into a wrangle in the hearings over whether Diabinese, an oral antidiabetic drug, is always safe. One specialist charged that side effects have been fatal in some cases, an argument Pfizer quickly challenged.

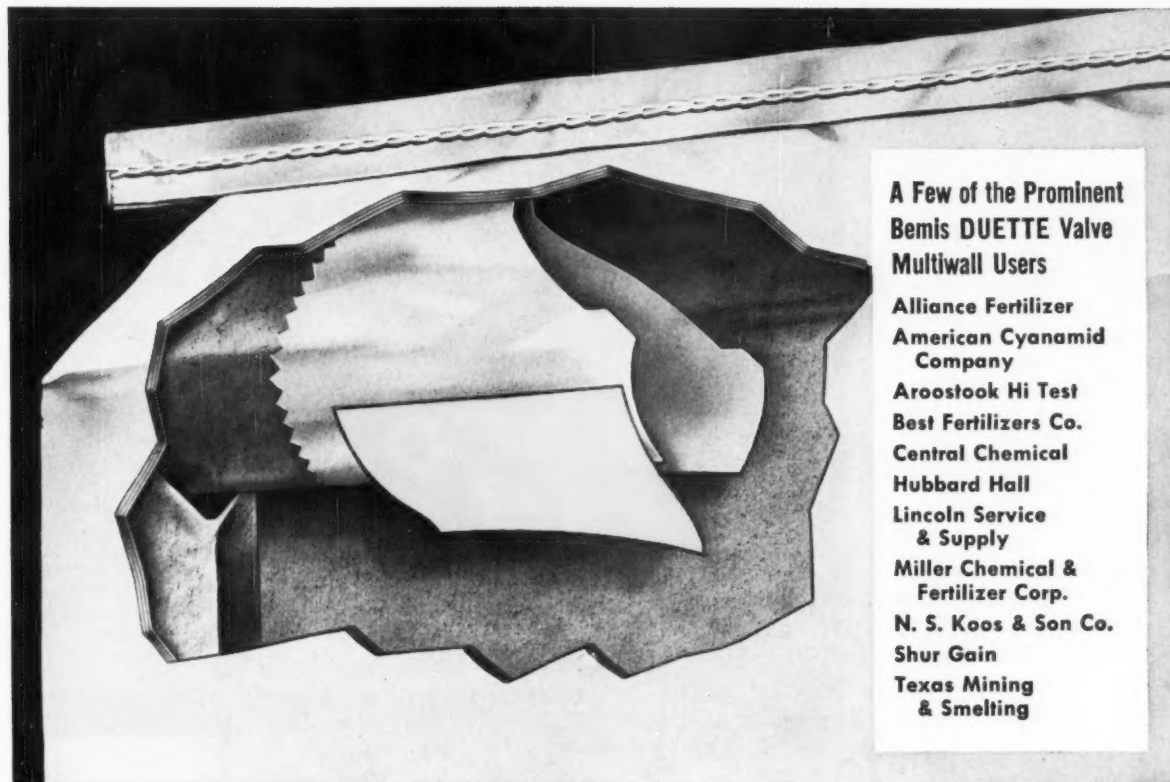
The drug firm suggested that the Kefauver hearings are no place for such arguments. They proposed a separate symposium for full discussion of doctors' experience with the drugs.

•
The Pentagon's new budget came out of the House Appropriations Committee with \$122 million tacked on. But like last year, the lawmakers did some massive overhauling on individual procurement and R&D projects in which chemical process companies are important suppliers.

The Air Force's Bomarc-B antibomber missile was trimmed even more and funds for a \$294-million Navy aircraft carrier were knocked out. On the plus side, money was earmarked for extra Polaris missiles and nuclear subs, military satellites, Minuteman ICBM development.

The committee took a serious swipe at Pentagon procurement policies, demanded that the military exercise more economy. To force this, the lawmakers cut \$400 million from procurement funds.

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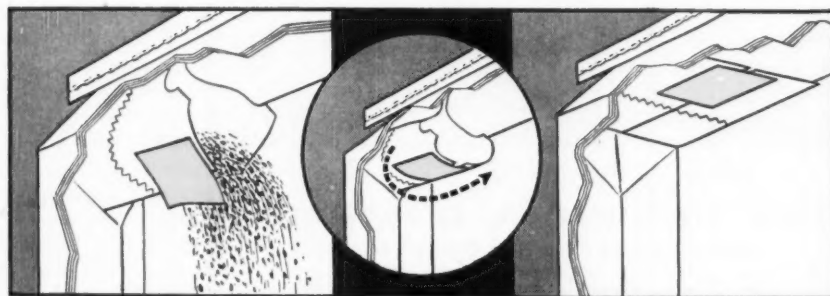


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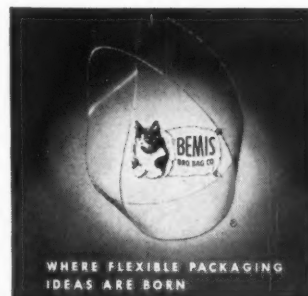
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RESEARCH



Andresen and Kimelman pool their talents to come up with a new venture-capital banking house. CW PHOTO—BU WALLOWITZ

Matching Venture Money, Research Risks

The two men pictured above—John Andresen and Oscar Kimelman—are busily drawing up plans for a new banking house that will specialize in venture capital for small, research-minded companies with hot product ideas. No newcomers to this business, they've already parlayed the experience and backing of a select group of investors into big profits from 20-25 small companies in the past four years.

They offer a new concept of venture-capital financing: influential stockholders who can offer a fledgling concern extensive free consulting talent in almost every area of management. Meaning for small, research-heavy firms and individual inventors: access to management experience as well as financial backing. Most recent example of a company that they started from scratch is Princeton

Chemical Research, Inc. (Princeton, N.J.), which got an initial \$141,000, opened its doors on March 1.

Well-known specialists in this area of finance—American Research & Development Corp. (Boston) and Laurance Rockefeller (using his personal funds)—have preferred to steer clear of involvement in the management of their investments. Consequently, they have had to exercise more caution, limit selections to well-managed enterprises in most cases.

New Setup: Andresen (currently with Wall Street's Riter & Co.) will head up the firm as full-time senior partner. Kimelman will serve as a limited partner, while continuing to maintain his own accounting firm in New York. The new enterprise will be called Andresen & Co., is scheduled to start operations July 1.

Each investor in the group will act

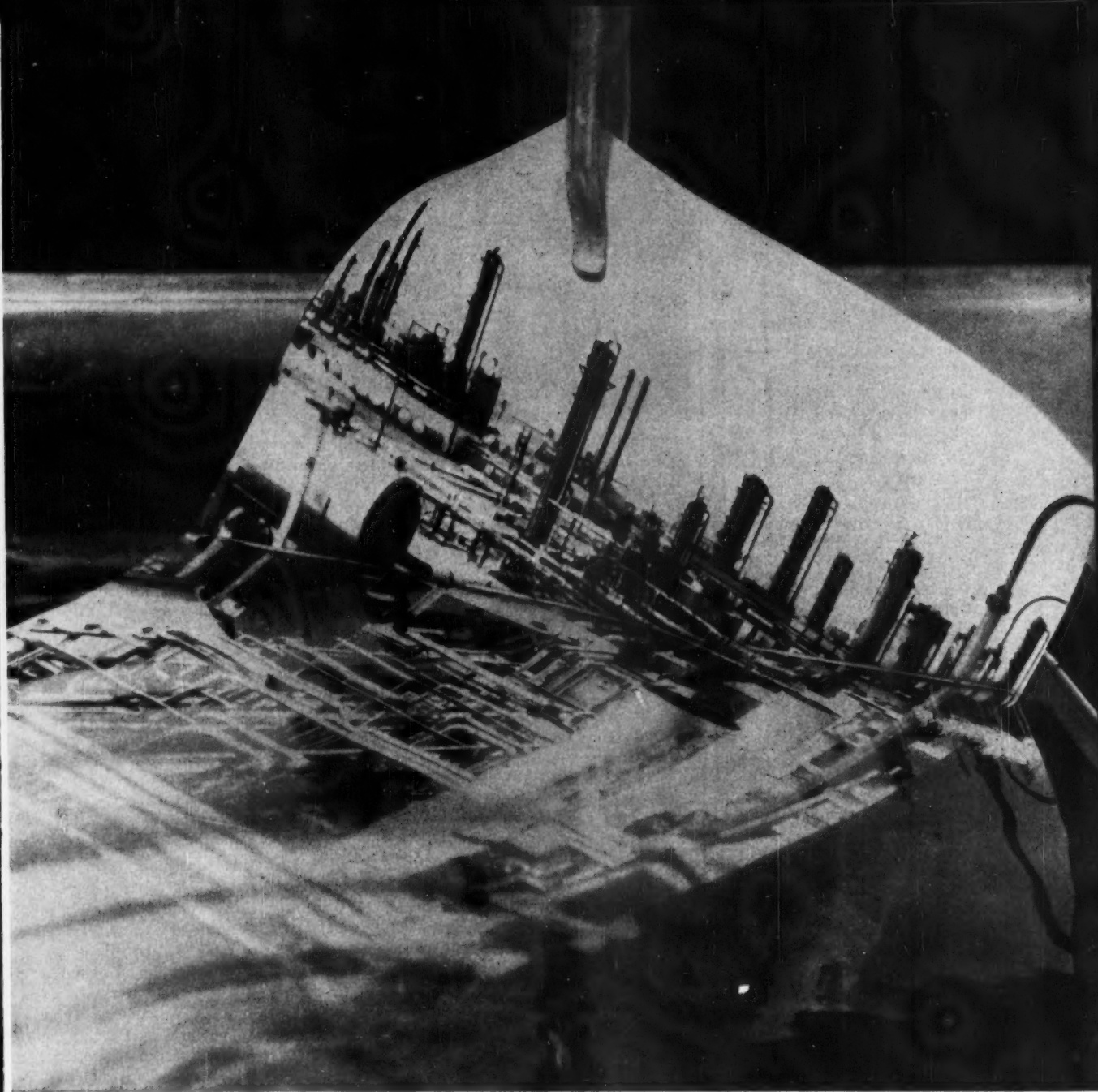
in his own behalf, using personal funds. Added incentive: possibility of substantial capital gains (taxed at a 25% rate, leaving the investor with 75¢ of each profit dollar) weighed against the danger (for 90%-tax-bracket people) of losing only "10¢-dollars." This attractive risk was made possible by last year's enactment of Section 1244 of the Internal Revenue Code allowing investors in small businesses to deduct losses from regular personal income.

Chief asset of the new firm will be its talent pool of investor-consultants. Among the most active participants in this group: Joseph Abeles, president of Kawecki Chemical Co.; William Woodcock, a vice-president of Union Carbide International Co.; Charles Walton, a divisional vice-president of Minnesota Mining & Mfg. Co.; William Hack, president



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RESEARCH



Laurance Rockefeller is willing to wait for long-term return on investment.



ARD's General Georges Doriot eyes management depth of hopeful firms.

of Audio Devices, Inc. (which was itself originally financed by Kimelman and others of the present group); and Wall Street's Samuel Stedman and George Edgar of Carl M. Loeb, Rhoades & Co., and also David Gottesman of Hallgarten & Co.

In addition, 10-15 other financial and legal specialists and about the same number of industrialists are occasional investors.

What They Look For: Most important thing in assessing a new venture is the marketable idea behind it, says Andresen. He and Kimelman are looking for ideas that can be developed quickly into proprietary (preferably patented) products with good market potential. They're looking for existing small companies, will also start from scratch.

Princeton Chemical Research is an example. Calvin Wolf, formerly research manager of Petro-Tex Chemical Corp., presented his idea for a new company to the investment group, got the money for the undertaking.

Wolf can't disclose just what idea attracted the group's interest, but admits that it wasn't contract research. He has a wide scope of experience, including catalysis, organic synthesis, metal alloys and powders, and electrochemistry. Contract research in these areas will be pursued to give the firm an immediate source of operating income, but Wolf says he wants to start doing internally sponsored work as soon as possible. This is evidently the chief lure.

Growth Criterion: Pioneer venture-capital concern American Research & Development Corp. also points to growth potential as the basic criterion for a proposed investment, considers

both the company and its industry.

But, since ARD prefers not to manage the companies it invests in, it also looks for firms with business talent as well as a solid technical core, according to General Georges Doriot, ARD president.

ARD has no unbreakable rules about the size or age of the companies it will invest in. Medium-size firms have attracted its capital, as well as small ones. And ARD has also started new firms (e.g., High Voltage Engineering Co.; Ionics, Inc.).

Laurance Rockefeller's staff uses criteria similar to those noted by ARD (with whom he has cooperated on several projects). But, in addition, Rockefeller expresses a responsibility to finance research companies concerned with defense work plus an interest in "helping young men whose chief asset is ideas."

Since the mid-'40s, he has invested several million dollars in about two dozen concerns (e.g., Nuclear Development Corp. of America, Itek Corp.). About half of these have subsequently been sold publicly or merged with other companies (e.g., Reaction Motors, now a division of Thiokol Chemical Corp.).

Money Plus Service: In order to minimize the risk in their investments, all venture-capital groups offer a certain amount of service in addition to their cash backing. This service is most extensive in the case of the Andresen-Kimelman group, where investors in each enterprise are chosen for the type of consulting and other help they can offer, as well as for their financial interest. One stockholder of Princeton Chemical Research, for instance, is a local con-

Progress Report...

—NIAX Triol LK-380

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New polyether base for better, lower cost rigid urethanes

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Insulation for acoustical tiles, refrigerators and freezers are some applications of low density rigid foams made from LK-380. It is suggested in the fabrication of sandwich partitions for construction, in nonsinkable boats, life buoys, and deck guards. Foams made from LK-380 can be blown with fluorocarbon gases to give excellent thermal insulation. Investigation of LK-380 for urethane coatings and adhesives is also suggested.

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Current news about a time-tested solvent

KROMFAX solvent (thiodiglycol, thiodiethylene glycol, B,B' dihydroxyethyl sulfide) is a powerful, chemically-neutral solvent for vat, basic and acid dyestuffs. It is non-volatile, almost colorless, and completely soluble in water. Its hygroscopic and antioxidant properties have long been important in the dyeing industry.

The use of KROMFAX solvent to prepare printing pastes from vat dyestuffs yields a higher color intensity than that obtained with alcohol or glycerol. It gives a finer dispersion of the dye prior to reducing it and improves the solubility of the sodium leuco form. KROMFAX solvent also markedly increases the fixing rate in the pre-reducing process. Its anti-oxidant nature prevents premature conversion of the leuco base of a vat dye into the finished color.

KROMFAX solvent is especially suited for pasting basic dyestuffs usually difficult to dissolve, such as indulines and nigrosines. It is also excellent for dyes used in direct printing and in color discharge and resist printing. It helps to produce prints of higher color values in wool, silk, acetate, rayon, and nylon fabrics.

KROMFAX solvent is also useful in cleaning printing rolls on which dye pastes have become laked and precipitated in the pattern.

With thiourea and ammonium sulfate, KROMFAX solvent forms a "universal combination" that simplifies the printing of nylon with acid and direct colors. The mixture dissolves the dye, swells the fibers, and fixes the dye in the fibers.

KROMFAX solvent will condense with hydroxyl-containing compounds in the presence of acid catalysts to form mixed ethers, many of which are effective synthetic lubricants. Thiodiglycol reaction products have good inherent anti-oxidation properties, due to the sulfide link-

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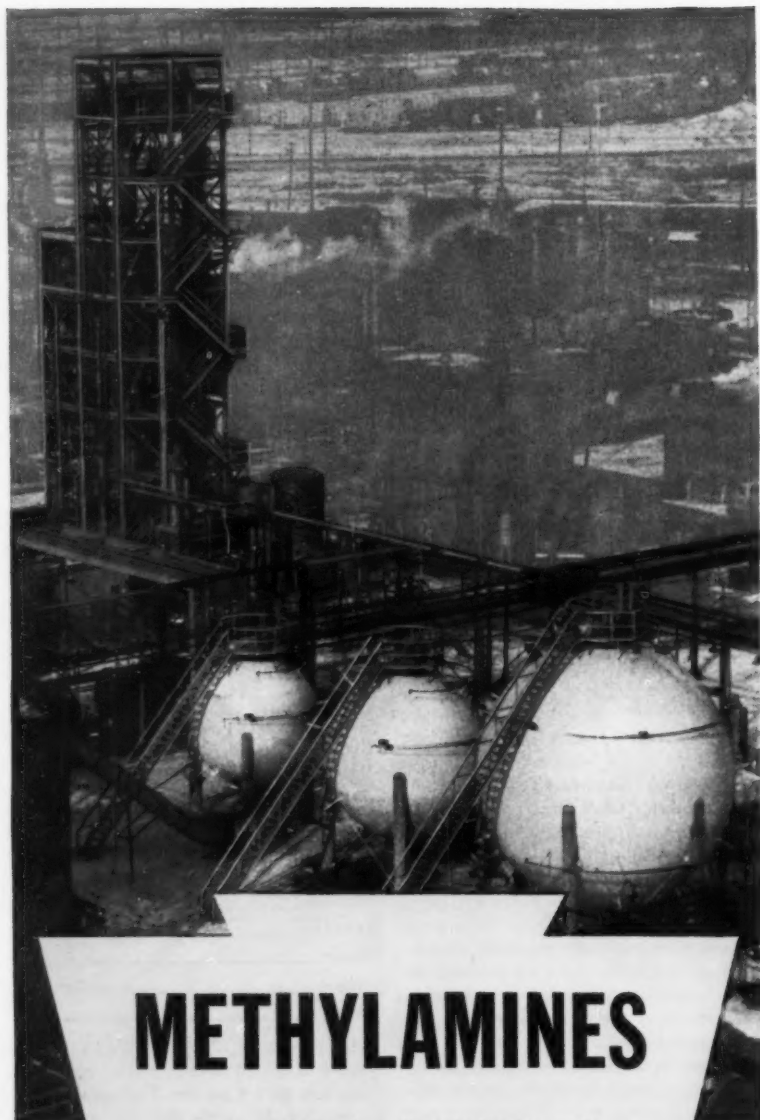
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RESEARCH

tractor who built a laboratory to Wolf's specifications, then leased it to the new company.

In addition, Wolf has already received help from his stockholders in these areas: leads to research contracts, legal advice on patents and licensing, technical and marketing guidance in choosing areas to emphasize. And more money will be available whenever it's needed.

ARD and Rockefeller take less part in advising management, but are generally represented on the board of directors. However, Rockefeller will see that a company's management is shored up, if need be.

In some cases, ARD will offer extra financial services to companies in which it has an interest. These services may include aid in borrowing money from outside institutions—ARD, however, may lend the money itself in order to be assured of a future source of steady cash income.

Investors' Opportunity: These groups offer a limited opportunity for participation by outside investors. ARD and Rockefeller generally finance only part of an enterprise, leaving room for substantial ownership (and sometimes control) to the firm's officers and the public.

The Andresen-Kimelman group welcomes capital from individuals who can offer special aid to the project, but these individuals are usually those who make the original proposal or enter the firm's management.

Any new venture involves risk, but profits can come in fast if a company clicks. Andresen and Kimelman want to see big profits as fast as possible. ARD is a bit more patient with its holdings, while Rockefeller will wait for long-term gains.

Heavy Competition: The number of inventors and small firms vying for available funds is staggering. The Rockefeller office, for instance, receives about 1,000 proposals a year, some 200 of which merit investigation. About 50 of these get thorough scrutiny; three or less are backed.

ARD reports an acceptance rate of just 1% of the ideas it investigates, while Andresen says his group receives 3-5 promising ideas each week.

It's clearly not easy to get venture money, but there's plenty of evidence that an idea with real potential can find the backing it needs to pay off.

Chemical Week • May 7, 1960

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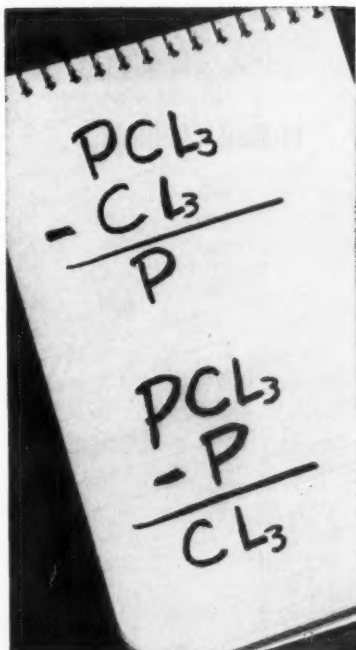
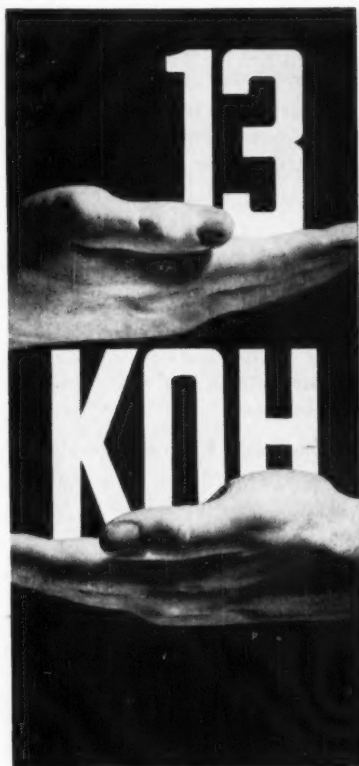
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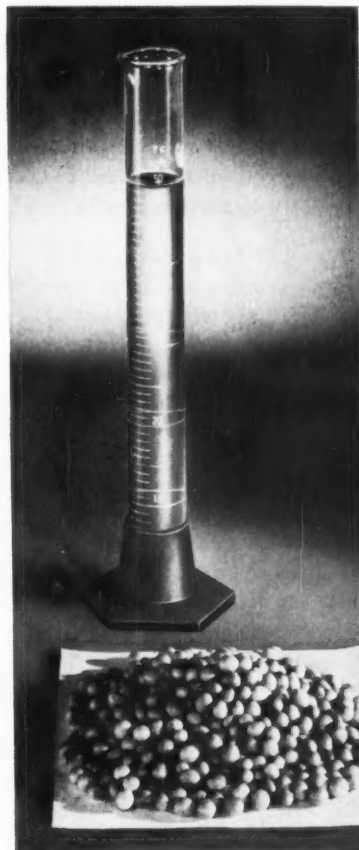
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Moreover, our product meets these specifications *at all times*.

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The unique behavior of SAIB provides a new approach to formulating

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in lacquers...

in melt coatings...

IN PLASTICS SAIB speeds processing... improves properties of molded and extruded cellulose acetate plastics

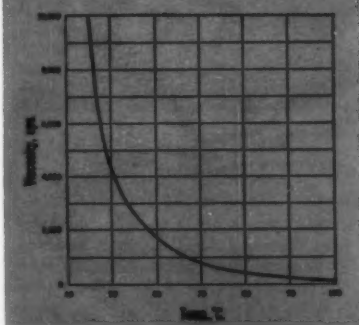
When used in conjunction with dimethyl phthalate and other common plasticizers, SAIB offers processors of cellulose acetate plastics easier dry blending, faster molding and extrusion rates, and improved physical properties.

By reducing the cold solvency characteristics of the more active plasticizers during dry blending, SAIB promotes faster and more even distribution throughout the cellulose acetate mix.

SAIB has an extremely high viscosity index (see Fig. 1). At 70°C., the viscosity is less than 1,000 centipoises. Below 70°C., a sudden and sharp increase in viscosity occurs. At room temperature, SAIB is a semi-solid. At processing temperatures, SAIB aids in plasticization, resulting in faster, more uniform flow through molding and extrusion cylinders. At room temperature, the opposite effect occurs: SAIB stiffens the plastic and increases its surface hardness. This unusual behavior of SAIB permits molding and extrusion conditions applicable to a material one or two flows

softer than its hardness at room temperature would indicate.

Figure 1 Effect of Temperature on the Viscosity of SAIB



The presence of SAIB also increases rigidity and tensile strength, and decreases weight loss on accelerated aging of cellulose acetate formulations.

IN MELT COATINGS SAIB extends peelable coatings... lowers application temperatures of hot melts.

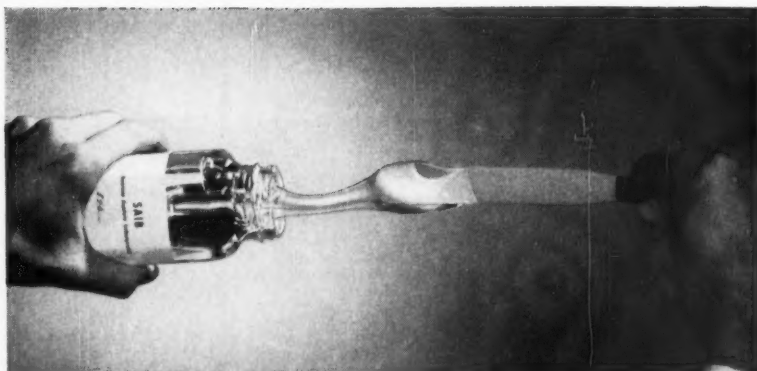
The excellent permanence, compatibility and stability characteristics of SAIB result in improved hot melt and peelable plastic formulations.

Tough, flexible melt coatings that do not fume at melt temperatures can be formulated containing up to 70% SAIB. Operating temperatures are reduced, too. In butyrate hot melts, for example, high modification with SAIB permits an application temperature of 275°F. instead of the usual 350°F.

In ethyl cellulose compositions, SAIB reduces mineral oil exudation through its solubilizing effect, thus permitting use of greater amounts of oil. In peelable coatings, SAIB maintains flexibility because it improves resistance to exudation.

IN LACQUERS SAIB produces high-solids content cellulosic lacquers at practical application viscosities... improves sprayability of vinyl and acrylic lacquers... increases adhesion to Mylar polyester film and nylon.

The high degree of compatibility exhibited by SAIB with virtually all major film-formers coupled with its exceptional solubility in most common lacquer solvents (see table in the next column) permits the formulation of high-solids lacquers at practical application viscosities.



SAIB has an average molecular weight of 838 and a compact molecular structure. It has an extremely high viscosity index. (At room temperature, it is a semi-solid. At 70°C., its viscosity drops to less than 1,000 cps. At 100°C., it is only 100 cps.) SAIB is light in color and unusually stable to ultraviolet light. It exhibits outstanding hydrolysis and thermal stability. (Less than 0.1% is hydrolyzed after refluxing 96 hours with water. Heated to 175°C. for a period of 6 days, its color increases slowly to straw yellow, with no appreciable change occurring until after 24 hours of heat-aging.) SAIB is compatible with a wide variety of polymers, modifiers and plasticizers, and is highly soluble in common lacquer solvents. (A 90% solution of SAIB in ethyl alcohol has a viscosity of only 750 cps. at 30°C.)

Viscosity of 50% SAIB Solutions

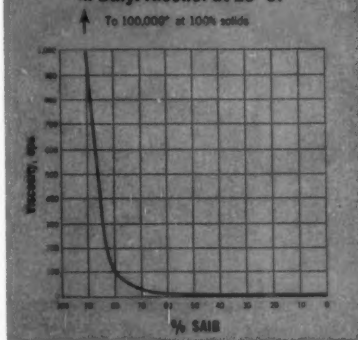
(Brookfield viscometer, 25°C.)

Solvent	Viscosity, cps.
Ethyl alcohol	8
Isopropyl alcohol	14
Ethyl acetate	8
n-Butyl acetate	9
Toluene	9
Hexane	6
Methyl ethyl ketone	6
Methyl isobutyl ketone	8
1-Nitropropane	11

Note that these data are for 50% solutions. Let's consider now the viscosity of SAIB solutions at higher concentrations. The case for ethyl alcohol is shown in Fig. 2. Similar viscosity-concentration relationships exist between SAIB and other common lacquer solvents.

From this graph it can be seen that at the highest conceivable concentration at which SAIB might be used to modify a lacquer system, its effect on solution viscosity is negligible. Even after much of the solvent has evaporated from the film, SAIB does not hinder flow-out or leveling. While this behavior might also be observed with certain plasticizers, SAIB does not exhibit plasticizing properties.

Figure 2 Viscosity of Solutions of SAIB in Ethyl Alcohol at 25°C.



With nitrocellulose, for example, the Sward hardness of a 50% SAIB-modified film is increased from 65 to 78. Cellulose acetate films also are increased in hardness upon addition of SAIB. In this case, however, maximum hardness occurs at a concentration of about 25%. With cellulose films other than nitrocellulose and cellulose acetate, high modification produces only a slight decrease in hardness with no significant change in solution viscosity.

Lacquers that show very good adhesion to Mylar polyester film and nylon (and heat sealable, too, if desired) can

be formulated with SAIB and Half-Second Butyrate. Vinyl and acrylic solutions modified with SAIB show improved sprayability with less cobwebbing tendency. Greater flexibility for SAIB-modified polymers can be achieved, if necessary, by including small amounts of Eastman polymeric plasticizer NP-10.

Acting as a plasticizer under certain conditions and as resin-modifier or -extender under others, SAIB is truly a multi-functional material. Its unique behavior, combined with its low color, stability and moderate cost, make SAIB a compound worth looking into now.

SAIB is sold both as a 90% solution, designated SAIB-90, and in the undiluted form, designated SAIB. For samples and a report on its physical properties and performance, write to your nearest Eastman sales office or to EASTMAN CHEMICAL PRODUCTS, INC., Chemicals Division, KINGSFORD, TENNESSEE.

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ENGINEERING

Cyanamid's Bauman (l.), Forlenza tell how to save on inquiries.



Type of Estimate

Prorated

All costs are prorated according to plant capacity.

Equipment Estimated

Equipment costs are estimated after engineers have calculated sizes. Materials are prorated.

Equipment Quoted

Equipment costs are quoted by manufacturers after engineers have calculated sizes. Material costs are prorated.

Detailed Estimate

Equipment costs are quoted by manufacturers after engineers have calculated sizes. Material items are detailed by engineers and draftsmen and their costs are estimated.

Organized Bids: Key to Cutting

With \$1.42 billion of new-plant construction slated for the CPI in '60 — and \$1.64 billion in '61 — chemical management men are currently keeping engineering contractors plenty busy preparing competitive bids on proposed expansion projects. But some process firms are wasting money in blissful ignorance of effective management procedure in this area.

Many simply fail to realize that working up these bids is complicated (see table, p. 41) — and expensive. Adopting a sound policy for soliciting bids could mean sizable savings.

There's no doubt that unorganized bidding procedures cost the CPI extra dollars. Reason: the fees of all contractors are necessarily set to reflect the cost of preparing a bid — and these higher fees are eventually paid for by the customer.














Conservative estimates place the cost of preparing a detailed bid-estimate at 1-2% of total installed cost of the plant. Wasted effort in preparing unsuccessful bids may run as high as \$50 million/year, which is passed along to the chemical industry.

Well aware of the situation is

American Cyanamid Co., which last week outlined to CHEMICAL WEEK its method for soliciting bid-estimates on new plants. Reason behind the development of Cyanamid's technique: "enlightened self-interest." Since everyone must share the costs of unsuccessful bidding, declares the company, Cyanamid is anxious to share its knowledge, keep these costs to a minimum.

Both G. A. Forlenza, Manager of the Process Engineering Dept., and H. C. Bauman, Manager of Cost Engineering (see photo, above), are quick to acknowledge the importance

Bid-Estimates: What They Cost

Costs		Personnel
up to \$1,000 up to \$10,000		Sales engineer
\$1,000 to \$3,000 \$2,000 to \$10,000	 	Sales engineer Estimator
\$3,000 to \$10,000 \$2,500 to \$25,000	   	Sales engineer Estimator Engineer Purchasing agent
\$4,000 to \$25,000 1% to 2% of total installed cost.	     	Sales engineer Estimator Engineer Purchasing agent Design-draftsmen

New-Plant Costs

of contractors, besides having acute awareness of the contractors' problems. "Bid-estimating is one of the engineering contractors' biggest overhead costs," says Forlenza. "It's up to us to help them reduce it. If we don't, the contractors include it in their fees, and we end up paying for it anyhow."

Discussing an expansion now under way at the company's Welland, Ont., facility, Forlenza guessed that each contractor spent \$30-40,000 to prepare a bid on the plant. For this reason Cyanamid's standardized bidding procedure was used to eliminate

unlikely contenders, and to keep estimating costs to a minimum.

Route to Firm Bids: Its standard procedure follows two principles: (1) Cyanamid approaches only those contractors in whom it has complete confidence, and (2) contractors are never asked to guarantee bids unless money has been allotted for the project. It works like this:

First, an "order-of-magnitude" estimate is made up. This estimate, frequently requested from a single contractor, is for a plant to produce a nominal capacity. It's reviewed by Cyanamid's Cost Engineering Dept.

"We compare it with our own estimates and add contingencies," says Bauman, "then use it as a basis for deciding on capacity and type of feedstock."

If the order-of-magnitude estimate shows management the plant is a good venture, a group of specialized contractors are requested to prepare a "study" estimate. They are told this will be used to obtain money authorization for the new plant. Though their estimates are to be approximate, the contractors are warned that a definite guaranteed bid will be requested once money is allotted; and the guaranteed estimate should not vary considerably from the study estimate.

When all the study estimates are in, they are used by Cost Engineering to prepare an "authorization estimate." This is submitted to management with a request for money to build the new facility. Once money is approved, the authorization estimate forms the basis for the final inquiry that is returned to the contractors for guaranteed lump-sum bids.

By this time the number of bidders is reduced by the engineering and economic evaluation of the study bids. Sometimes only one contractor is asked to make a guaranteed bid, and the average number of inquiries is less than three. At the same time the specifications tying down the inquiry have grown. Whereas the request for an order-of-magnitude estimate was made by letter or telephone, and the study estimate was based on a specification including several pages, the guaranteed estimate is based on a bound volume of specifications that completely cover the scope of work and operation of the future plant.

Contractor's Dilemma: To determine how the typical engineering contractor handles an estimate — and how a company can obtain best results from a contractor — CHEMICAL WEEK queried eight major engineering companies around the country.

All were asked the same questions: (1) What types of estimates do you prepare? (2) How do you decide the type of estimate to make for a given inquiry? (3) What is the cost of preparing each type of estimate? (4) Do



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ENGINEERING

you have a special estimating group? How many men are in it? What are their skills? (5) What are the 3 most important things your clients could do to reduce your estimating costs?

The responses are kept anonymous, but the following are typical:

Inquiries are received by the sales department, which tries to ascertain, first of all, if the client really intends to build the plant. Approximately 50% of all inquiries are simply searching for information or, at best, are the kind described by Cyanamid as "order-of-magnitude."

If the sales engineer decides the inquiry is requesting information only, he uses available data to prorate the plant cost according to its capacity. On the other hand, if the sales engineer decides it merits more expense, he discusses it with the estimating department from the point of view of (1) time available to handle the job, (2) the liability and guarantees connected with the quote, and (3) what the quote should include.

Depending on these factors, the estimate is scheduled for the proper type of estimate described in the accompanying table, is then routed through the contractor organization. The departments that may handle it are:

- **Estimating Dept.:** This is a staff of engineers and experienced drafting-designers or construction men who spend their time estimating equipment costs or "taking off" bulk material quantities from engineering flow diagrams. Staff size ranges from 3% to 7% of the contractor's total force, though most popular size is about 4%. If the inquiry is a "hardware" bid (that is, the process flow diagrams have been developed by the client), this staff can prepare the bid estimate by itself. In a majority of cases, however, it's necessary for the contractor to develop the processing route; and the inquiry is passed on to the engineering sections.

- **Engineering Section:** Key man of the engineering section is the process specialist who has designed many plants like the one to be bid. If the inquiry is for an order-of-magnitude bid, this man can develop reliable answers in a few hours. If it is for a more detailed estimate, he can select an optimum processing route without wasting time and calculations on uneconomical alternatives. He's vir-

tually helpless without an engineering organization to back him up, however, for once he has worked out the process, the inquiry moves on through engineers (who calculate equipment sizes) to the drafting room.

- **Drafting Room:** Bulk materials such as piping and foundations take up from 60% to 80% of the total materials cost of a plant; and the design of these materials is handled in the drafting room. Thus, the accuracy of the estimate is a function of the accuracy of the engineering work, and for detailed estimates, the plant must be engineered in advance.

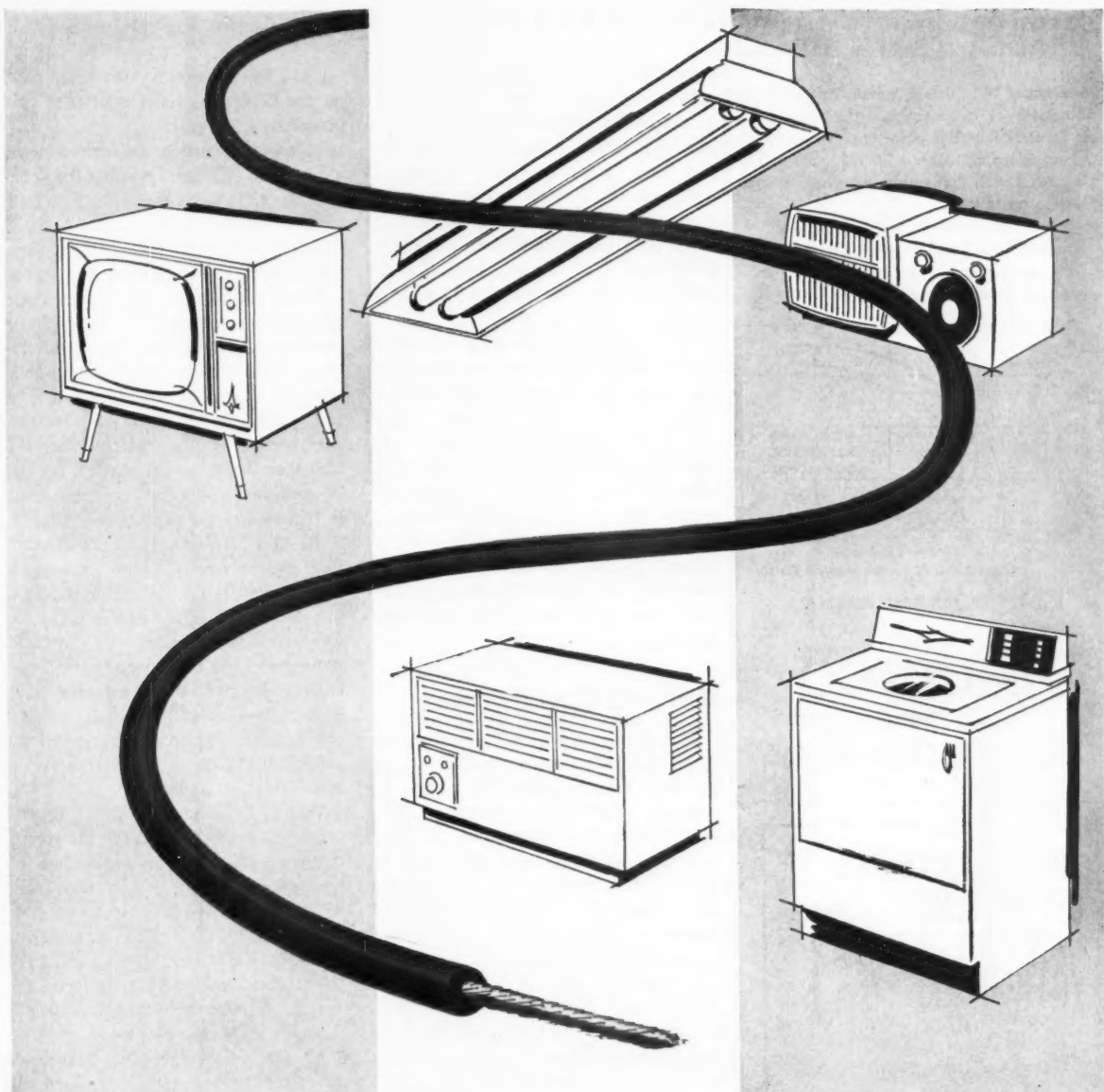
- **Purchasing:** For accurate estimates, major equipment, e.g., compressors and furnaces, must be quoted. And if the contractor guarantees his price, he, in turn, gets guarantees from the equipment suppliers. This is done by the purchasing department.

- **Central Management:** The overhead and profit margin can vary widely from the average 7%, depending on the competitive outlook for the process under bid and the work load in the contractor's office. The decisions on this are made by the contractor's top management and kept strictly confidential.

The cost of handling an estimate through these groups varies widely with the type of job. In a complicated petroleum refinery, where there is a selection of several competitive processing routes, each route must be investigated and sometimes completely calculated to find the one that is most economical.

On the other hand, a hardware estimate with the process specified by the client takes a minimum of engineering work. The differences between these two types of estimates are shown by the variation in cost. The spread between the cost of hardware and process-engineered estimates is also reflected in a spread between the yearly budgets given by some of the contractors. Typical of a firm that estimates chemical plants, which are mostly hardware jobs, was a budget of \$400,000/year. A firm that had been quoting mostly refineries gave its past year's estimating budget as \$2 million.

Unwelcome Invitations: In dealing with customers, the number one plea of all engineering firms is that clients limit the number of invitations to bid on a given project. The reason for this



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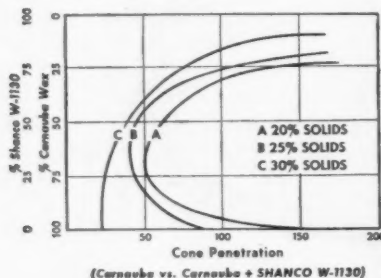


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ENGINEERING

is obvious: only one firm can get the job. Here's one firm's experience: a contractor spent \$120,000 to prepare a detailed estimate. He lost the job, later found out that five other contractors had been invited to bid. Assuming that all bidders spent the same effort preparing their estimate, it's figured that this one inquiry cost \$600,000 in wasted engineering energy.

The numbers in the table were obtained from the engineering contractors, show the importance of bid-estimating costs: they total more than 1% of the total installed cost of the plant. Assuming three unsuccessful bids per plant, 3% of the total installed cost can be considered wasted. With the CPI spending about \$1.5 billion annually on new plants, this represents \$50 million in unsuccessful bids. This much loss cannot easily be ignored.

Natural Gas Purifier

The development of Fluor Corp.'s solvent carbon dioxide removal process opens a new route to the purification of high-pressure natural gas. First commercial installation of the process — a \$3-million, 100-million-cu.ft./day facility for El Paso Natural Gas Co. (*CW Technology Newsletter*, April 16, p. 80)—goes into construction this month, is scheduled for startup in December.

The need for improved purification techniques to handle increasing quantities of carbon dioxide-rich natural gas has sparked the development of several routes. Fluor's goal was to perfect a simple method of treating gas that can't be handled efficiently by existing commercial processes. Specifically, it concentrates on a system that combines the low heat-energy requirement of the water-wash removal process with the low pumping requirements of the monoethanolamine system.

The screening of several solvents finally narrowed the field to four materials — propylene carbonate, glycerol triacetate, butoxy diethylene glycol acetate and methoxy triethylene glycol acetate — covered by Fluor's patents (U.S. 2,926,751; 2,926,752; 2,926,753). Following bench-scale testing of the process, commercial development was undertaken jointly by Fluor and El Paso

in a 1.5-million-cu.ft./day pilot plant at the latter's Terrell County gas field in western Texas.

Cleanup Process: Solvent removal of carbon dioxide consists of contacting CO₂-rich gas with lean solvent solution at high pressure in a conventional countercurrent absorption column, then flashing the loaded solvent — first at an intermediate pressure and finally at atmospheric pressure — to remove dissolved hydrocarbons, water, sulfur compounds and carbon dioxide. Hydrocarbons recovered from the intermediate-pressure flash are returned to the absorber; lean solvent, cooled by the desorption and expansion of CO₂, is recycled to the top of the column.

Results of pilot-plant tests indicate that the solvent removal process is well suited to treatment of natural gas containing high concentrations of CO₂ at high pressures. And because hydrogen and nitrogen are only slightly soluble in the solvents, says Fluor, the process is also attractive for synthesis gas purification where sufficiently high CO₂ partial pressures are encountered.

Fluor's estimates of initial investments and operating costs for plants treating 110 million cu.ft./day of feed gas (basis: CO₂ reduction from 53.2% down to 2%; water reduction from 70 F to 32 F dew point) shows a total treating cost of 2¢/-1,000 cu.ft. of feed for solvent removal. For comparison, alternate methods produced estimated costs of 2.7¢ for the Giammarco-Vetocoke process (with air stripping); 3.4¢ for water washing; 4.3¢ for a hot potassium carbonate removal system.

The economics change, however, with feed composition, product specification and other design factors. No one process can be expected to provide the optimum solution for all cleanup jobs, says Fluor. For example, at lower CO₂ partial pressures, or with increasing concentrations of heavy hydrocarbons in the gas, the economic advantage swings toward the Giammarco-Vetocoke process.

There's room for all processes, says Fluor. And with natural gas producers delving deeper into carbon dioxide-rich reserves, the company is hopeful of landing a fair share of jobs where solvent removal can show an economic edge over the others.



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Oronite continues to market ALKANE "56" where the detergent manufacturer desires no change in molecular weight.

Behind Oronite's leadership in the field of detergent raw materials lies continuing research and technical service which extends from the raw materials for polymer and alkylate to the development, evaluation and the processing of detergent formulations. You expect more from the leader—and you get more.

*Trademark for Oronite's detergent intermediate.

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SA-88. Oronite SA-88 (sulfonic acid) is an intermediate detergent in liquid form, resulting from the sulfonation of Oronite Alkane detergent intermediate. The major advantage of SA-88 is that it allows compounders a wide selection of neutralizing agents to produce finished detergents with tailored characteristics.

Wetting Agent "S" & Detergent Slurry. Both materials are paste type ALKANE sulfonates derived from caustic neutralization of SA-88 (sulfonic acid). They are easily processed into liquids or dry detergents in flake, granule, bead or powder form.

Dispersants NI-E, NI-O, NI-W. All of these products are nonionics in liquid form of the alkylphenol ethylene oxide condensate type. Dispersants NI-O and NI-E are oil soluble, with NI-O being slightly more hydrophilic. NI-O and NI-E are used primarily in the formulation of dry cleaning detergents and for the preparation of industrial emulsifiers. NI-W is water soluble and finds its primary use in compounding heavy duty household and industrial detergents.



Oronite DIBASIC ACIDS

Since pioneering production of phthalic anhydride from petroleum, Oronite has allocated a good portion of its resources to researching, developing, commercial producing and marketing important dibasic acids. The high quality of these products plus the Company's affiliation with one of the world's largest producing and refining oil companies is your assurance that Oronite is capable of fulfilling your quality and quantity requirements. Why not talk it over with Oronite—one of the largest petrochemical resources for dibasic acids.



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Oronite Isophthalic is a non-caking, non-hygroscopic, high-melting white crystalline powder with controlled fineness. It is not fluffy, and flows with a minimum of dustiness. Although chemically similar to phthalic anhydride, Isophthalic differs markedly in physical properties and reaction characteristics. In molecular structure Isophthalic has its acid groups located in different positions on the benzene ring—giving it unique properties.

Isophthalic, pioneered and first commercially produced by Oronite, is one of the most significant new basic materials for the surface coatings and plastics industries in the past half century.

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Clearly, Oronite Isophthalic has come of age in the plastics industry. Scores of new products have found their way to market, countless products have been improved with Isophthalic. Today a giant 50 million pounds per year Oronite plant is serving an ever-increasing demand for Isophthalic by the plastics industry.

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Maleic Anhydride



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There are important advantages in placing your phenol business with Oronite. (a) Consistent highly pure phenol is always assured from Oronite's unique cumene manufacturing process. (b) Oronite is the only U. S. phenol producer with complete control of raw materials and manufacturing from start to finish, thus assuring uninterrupted supply. (c) Oronite phenol plant capacity has been increased almost 50% since production began just five years ago—proof of Oronite's ability and willingness to meet growing demand.

Oronite Phenol is shipped by tank car or tank truck from Richmond, California, New Orleans, La., Chicago, Ill., and Paulsboro, New Jersey. Contact any Oronite office and discuss your needs.

Acetone. Oronite cumene process Acetone has a purity of 99.5% minimum; typically 99.8%, and more than complies with the ASTM requirements. It is used as a vehicle in nitrocellulose lacquers, varnishes, rubber cements and in the manufacture of rayon, celluloid and cellulose acetate plastics.

Polybutenes

Oronite Polybutenes are synthetic polymers which are available in a wide range of viscosities—up to 20,000 S.S.U. at 210° F. Because of their non-drying, chemically inert and tacky characteristics, they have proved useful in a wide variety of end products such as: sound-deadening, insulation and calking compounds; as a dielectric in high voltage cables and capacitors; as an ingredient in the manufacture of pressure sensitive adhesives and leather goods. For Polybutenes technical bulletin or product samples—contact the Oronite office nearest you.

Gas Odorants

Oronite offers the most complete line of odorants to be used as warning agents for natural and liquefied petroleum gases. Utilities and transmission companies may depend on know-how gained from many years of experience and backed by the most dependable source of supply. Contact Oronite for your odorant requirements.

Lube Oil Additives

Additives which help base oils reduce engine wear as well as improve the performance of gasoline or diesel driven equipment are a specialty of Oronite.

Recently Oronite developed a reliable procedure for predicting field performance for newly compounded motor oils—minimizing the need for extensive field testing. With this proven technique, Oronite can provide a customer better performance from compounded motor oils at NO increase in current treating costs, or equal performance at a lower treated cost. Oronite suggested formulations, using any base oil, will enable an oil marketer to provide his customers superior products.

Product-wise, Oronite has just marketed a new additive, the 500 Series, which was specifically designed for today's driving conditions. With so much in-city, stop-and-start driving an oil must perform at low engine temperature to prevent engine sludge deposits. With new

500 Series Additives you get the best proven high temperature performance of previous Oronite diesel and gasoline additives—PLUS—the necessary low temperature performance, to add engine life and greatly extend periods of overhauling. Contact any Oronite office for complete information.

Fuel Oil Additives. Mixed with diesel, furnace and jet oil fuels to stabilize against deterioration, sludge formation and for preventing corrosion in presence of water.

Gelling Agent—GA-10. Makes possible the production of synthetic lubricants that will meet high performance specifications. For multipurpose grease lubricants; automotive, aircraft, marine, nuclear reactor or special purpose greases.

High Temperature Hydraulic Fluids. Oronite was "first" to develop a revolutionary new hydraulic fluid that will operate hydraulic systems at the intense temperatures created in supersonic aircraft or missile flight. Oronite High Temperature Hydraulic Fluid 8515 and 8200 are non-petroleum based silicate ester fluids, have low vapor pressure and constant viscosity in addition to desirable electrical properties.



Other Oronite Products



ADE-50. A quaternary ammonium compound in clear liquid form used principally as a high grade sanitizer and germicide.

Alkylphenol TD. A dodecylphenol, clear and slightly viscous liquid, which can be reacted to produce various types of non-ionic detergents. Potential uses include dyestuffs, insecticides, germicides, fungicides and anti-oxidants.

Butadiene. Polymerization grade, 98% minimum purity.

Hydrogenation Catalyst. Used in de-sulfurization process to remove sulfur, nitrogen and metals from petroleum feed stocks.

Copper Naphthenate. Used as a preservative for burlap, canvas and cellulose products against attacks of bacteria, fungi, wood parasites and marine organisms.

Better Technical Service!



The recent establishment of three product sales divisions by Oronite will provide greater product specialization in the field sales organization. Products are realigned into logical divisions to enhance communication between the Oronite laboratories and the customer. More information and data on the applications and end uses of Oronite products will become increasingly available to Oronite customers.



When a company becomes an Oronite customer, supplementary technical service continues—providing the customer new data as developed, suggesting ways of cutting costs, cooperating in every way possible to make an Oronite association more valuable.

Why not call Oronite? See for yourself the depth of our technical assistance on your problems.



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SPECIALTIES

How Aerosol Fillers Face the 'Captive' Threat

This week S. C. Johnson & Son, Inc. (Racine, Wis.), is busily turning out its spray furniture polish Pledge in a new, \$1-million aerosol plant. A few months ago the same work was farmed out to a contract filler. Johnson's move is an example of the continuing trend of aerosol marketers to do their own high-volume packaging—a trend which has altered the aerosol component supply picture and taken business from contract aerosol fillers.

The suppliers now must sell their fluorinated hydrocarbon propellants, valves, cans and other components for pressure packages to marketers, in addition to contract fillers.

The filler in many cases has felt the pinch in his pocketbook when his marketer customers undertake their own production. This is causing fillers to re-evaluate their positions in the aerosol field, to consider whether to go beyond the limited role of filling cans, into functions such as manufacture of aerosol components or marketing products bearing their own labels.

Marketer and Manufacturer: This year nearly 100 companies are marketing pushbutton packages that they have manufactured in captive aerosol filling plants (although all supplement their lines with contract-filled items).

Shortly after World War II, the first aerosol products to hit the market were primarily made by fillers, who were only marginally marketers. (Bridgeport Brass Co., for example, went into the filling business in '47, marketed the first aerosol room deodorant in '48.)

In the early '50s the giant marketers of household products and toiletries began to build aerosol facilities of their own. One of the first was the Boyle-Midway Division of American Home Products (New York). Other aerosol marketers with rising volume soon joined.

Stanley Home Products (Easthampton, Mass.), which now sells some 22 aerosols, installed its first filling line in '54, added a second last year. Stanley is in the unusual position of being a custom filler. The company loads spot remover, air freshener and



Price Cutter

Determined to meet competition, he has hacked his price down to the point where he's holding on to his customer—losing his shirt.



Bewildered

He doesn't quite know what's going on in the industry, sees his customers becoming captive fillers and doesn't know what to do.



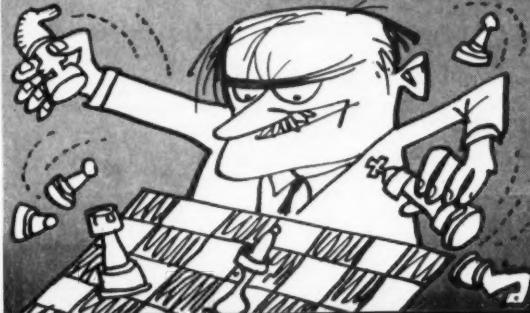
Eternal Optimist

Unfazed by talk of mounting competition, he thinks he'll survive any trade upheaval, sees no need to adjust to changing trends.



Visionary

Not interested in being a filler per se, he sees himself as a creator of new ideas, thinks all nonaerosols archaic.



Empire Builder

He has dreams of marketing his own aerosols, of buying a valve company, making his own cans, and components.

Fillers View Future

JOHN C. STALFORD & SONS, Inc. (Baltimore, Md.): It's normal for a company with large aerosol sales to install its own capacity. But contract fillers will still be indispensable for many companies who are merchandisers and want no part of manufacturing.

PETERSON FILLING AND PACKAGING CO. (Danville, Ill.): Too many fillers are taking the attitude that there is plenty of business, that they can rest on their laurels. There are bigger worries for the loader than captive filling.

AEROSOL TECHNIQUES, INC. (Bridgeport, Conn.): The filler's most significant function is to create practicable ideas and develop new products at the lowest possible cost. Aerosol research is a technology all its own.

G. BARR & CO. (Chicago): Marketers installing their own lines are not going to change the contract-filling field. There is no reason to become panicky.

POWR-PAK, INC. (Bridgeport, Conn.): The contract filler has been hurt by captive lines; he should be realistic enough to admit this trend will most likely continue. In the future, he must offer not only mere filling facility, but a complete service the marketer can't perform.

CONTINENTAL FILLING (Danville, Ill.): The future of the contract filler lies increasingly in new products and new aerosol marketers. Losing customers to captive filling rates our serious consideration.

FLUID CHEMICAL CO., INC. (Newark, N.J.): A filler comes to a point where his usefulness is diminished if his customers don't install their own lines. He has a moral and financial obligation to cooperate in such a situation.

WESTERN FILLING CORP. (Los Angeles): One of the fortes of the custom packager is his versatility, ability to roll with a punch.

insecticide for other firms on a contract basis.

The Fuller Brush Co. (Hartford, Conn.) embarked on its own operation four years ago, now fills 75% of its aerosols (exceptions are colognes and perfumes).

Other large-scale marketers doing the bulk of their own aerosol filling include Rexall, Revlon, Shulton and Avon.

Why Do-It-Yourself? Companies generally can save money by doing their own filling, but only when they sell a large number of units. The number is a matter of debate in the aerosol industry. A figure often quoted is 1 million units/year. Johnson, however, says it did not find a plant economical until the 13-million-units/year mark had been passed.

Other factors which contribute to captive filling include prestige, stricter product control and tighter security on formulations.

Stanley Home Products recalls that its first aerosol line coincided with installation of other automatic equipment in its factory. Additional reasons for manufacture were "substantial savings in many instances" and ability to "manufacture to our own formulations and specifications."

Learning the Tricks: Marketers who have launched into a filling venture do not advertise the problems they've encountered. But every captive filler must contend with: hiring a technically qualified staff; buying valves, cans, propellant, etc., and acquiring the equipment and space to store them; issuing product guarantees; shipping and warehousing. In short, "know-how" must be learned, and the marketer must assume all the worries he once left to the filler.

No Bill of Divorcement: Rarely does a captive filler break completely with his custom loader, whom he still relies on for part of his production, "know-how", and product development.

Johnson says it will continue to depend on contract fillers for a substantial share of its loading and that even when the new plant is running at full capacity it will be able to fill only a part of Johnson's needs.

Another marketer-filler believes the custom filler can develop formulations faster than the companies themselves because he is able to concentrate on a particular product while the marketer is concerned with de-

veloping a diversified line.

Fighting the Machine: The aerosol marketer has been encouraged to undertake his own filling, not by suppliers of propellants, valves, cans, etc. (who of necessity have been fence sitters), but by filling machinery makers.

One recent incident points up some of the in-fighting being done. In February, Kartridg Pak Co. (Franklin Park, Ill.), biggest maker of aerosol machinery, sent a letter to paint marketers, calling attention to the expanding sales of spray paint and suggesting they install their own packaging lines.

"Certain factors, such as high packaging costs (when a professional contract filler is involved), have heretofore made this field seem unattractive," the letter stated.

A number of custom fillers were upset by this. A. L. Davenport, Jr., president of Pactra Chemical Co. Inc. (Los Angeles), a custom filler that also markets its own paint, wrote 15 other custom fillers this open-letter reply to Kartridg Pak:

"Apparently [your] letter was written in ignorance . . . or misguided greed to sell not only the contract fillers . . . who have been your biggest customers . . . but their customers also."

Davenport, who is directing his attack only at Kartridg Pak, not all machine makers, told **CHEMICAL WEEK**, "what they are trying to do is tell marketers the custom loader is an illegitimate businessman, after we have invested from \$50,000 to \$500,000 in equipment. Now they want to cut our throats so they can sell more machinery."

He further said the aerosol industry is "already pretty cutthroat. If they try to split it up even more, it could mean loaders going out of business."

George Heath, sales manager of Kartridg Pak, feels that business for the contract filler will increase despite captive filling, because the aerosol field "is a young and dynamic industry that is growing every day."

Fillers in a Fix? According to the custom fillers surveyed by **CHEMICAL WEEK**, captive filling has had little effect on their business. Sentiment runs from complete lack of concern to a feeling that "other fillers will be hurt but not me." Some will admit privately, though, that the fillers as a whole have suffered from



IN YOUR IMPROVED PRODUCTS...

Jefferson Propylene Glycol and Dipropylene Glycol go to a picnic

Makes you wonder how they used to have picnics. This current American pastime is filled with your practical applications for Jefferson Propylene Glycol and Dipropylene Glycol . . . reinforced plastics of the boat and water skis, sun tan lotion, flavoring in the soft drinks and food, brake fluids, printing ink, plastic tablecloth, cigarettes, beverage cooler insulation, and insecticide.

The very low toxicity of propylene glycol leads to its wide usage in foods, pharmaceuticals, and cos-

metics. Dipropylene glycol is superior as a coupling agent or mutual solvent for normally immiscible liquids. It is most useful where a glycol of lower volatility and hygroscopicity is required. Both glycols are now available from Jefferson in the grades and quantity desired . . . tank cars or wagons, or 55-gallon drums. For complete information or technical services, write to Jefferson Chemical Company, 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.



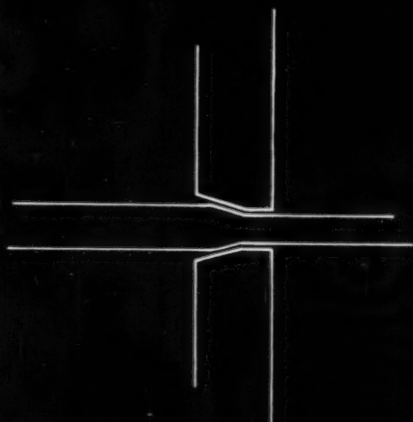
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DRAWING

SPECIALTIES

the withdrawal of what is often the cream of their business.

If captive filling has hurt anyone yet, it has been the filler who depends on a single company for a large portion of his income, and the larger fillers whose customers are usually the very big marketers mostly likely to install captive lines.

Of course, new marketers are continually entering the field. The filler can usually make up a big loss by taking on several of these smaller marketers, but he still loses money in the process.

Price cutting does not seem to be a way to prevent captive filling. Major marketers with high volume are already enjoying the filler's bottom price.

Growth to Bring Changes: As total aerosol production climbs higher (an estimated 1 billion non-food units in '68), more marketers will reach a sales level that will justify their own equipment. There are several views within the industry on what effect this will have on the custom fillers. One is that fillers will continue to expand along with the whole aerosol industry, another is that fillers will someday be entirely superfluous.

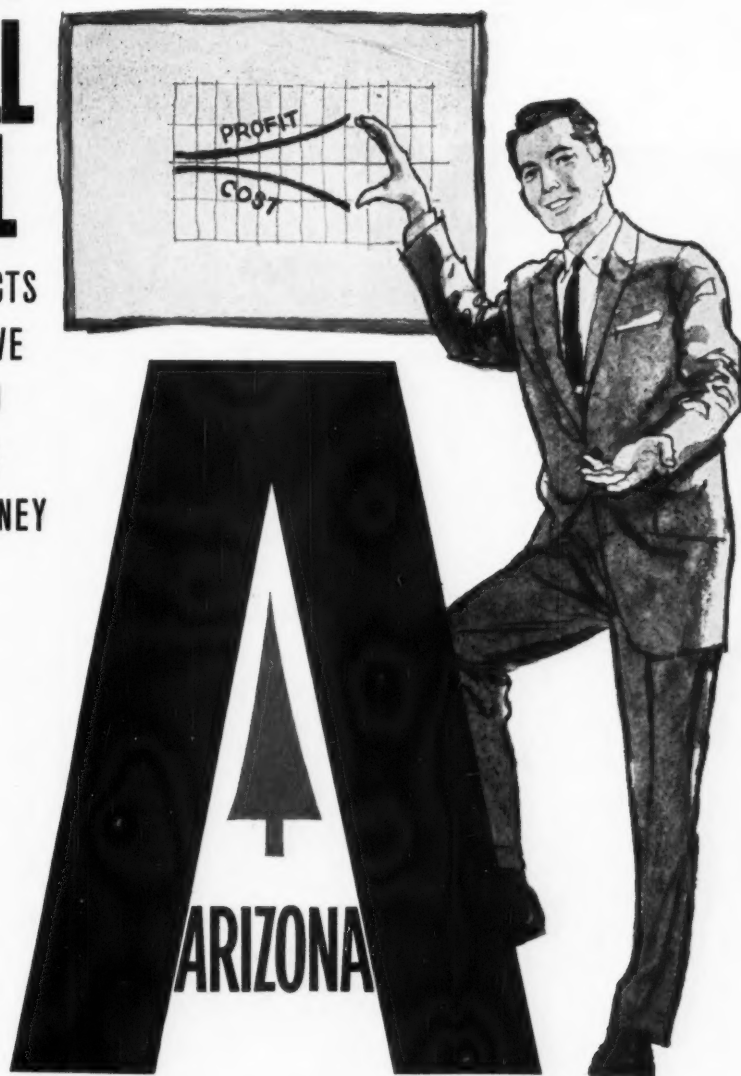
It seems likely that eventually custom fillers will have to occupy a different position. Instead of acting as large-run fillers, they will place more concentration on research and development of new products. Filling operations will largely consist of shorter runs for smaller marketers, overflow for big marketers, and new products in test market. More diversification is coming, too, (e.g., a toiletries filler branching into paints).

And just as they have in other branches of packaging, mergers seem likely to make the contract filling business more concentrated. There will likely be fewer fillers and those that survive will be larger. Also, as they grow, there may be a move toward super-fillers producing some of their own components, e.g., valves.

In many respects the contract filling business is made up of dynamic individuals who risked tremendous odds to build business up from alley shop operations to profitable large-scale operations. There is still an unusual amount of one-man rule among companies in the industry, and as long as this remains the case, look for some gloves-off fighting if anyone tries to displace them.

Chemical Week • May 7, 1960

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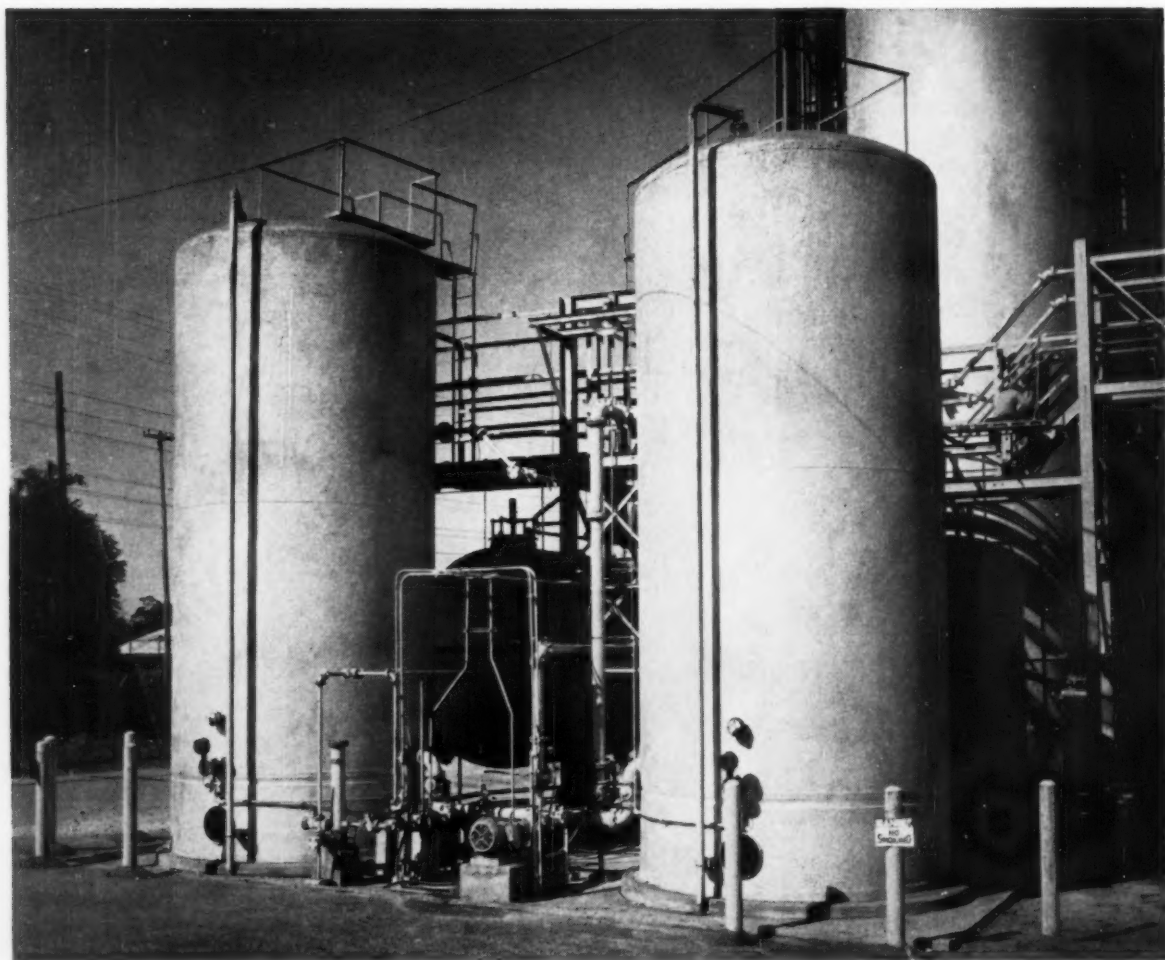
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May 7, 1960 • Chemical Week

FLUIDICS* AT WORK



Glaesteel takes the bite out of corrosive chlorine dioxide at Scott Paper Company's mill in Mobile, Alabama.

How to profitably end corrosion in every phase of ClO_2 generation

If you examined these tanks for dissolving and storing sodium chlorate, you'd find no evidence of corrosion at the constantly shifting liquid-air interface.

Combination of materials is the reason. These are Pfaudler® Glaesteel tanks—steel outside for strength, glass inside for corrosion resistance. And there is no rust contamination of the chlorate, which can cause troublesome "puffs."

Glaesteel towers and pumps. These tanks plus towers, pumps and ClO_2

storage tanks are part of the chlorine dioxide system at Scott Paper Company in Mobile, Alabama. In operation for over 15 months now, there has been no evidence of corrosive attack in any part of the system where Glaesteel has been used.

Economy the key. You will also find Glaesteel equipment in 38 other progressive pulp mills. And, whether the Solvay or Olin Mathieson process is used, the reports are still the same: Pfaudler Glaesteel turns out to be the

most economical equipment available, in terms of cost, maintenance and service life.

Complete systems. With this experience and our Project Engineering service, Pfaudler offers you or your engineering firm complete plant design, procurement and installation for ClO_2 generating systems.

More information. For details, or answers to specific questions, please write to the address shown on the facing page.

How to test the value of Glasteel polymerizers

Consider three important factors — purity of the polymer, amount of downtime, and initial cost. Then, look at what you can expect from Pfaudler Glasteel polymerizers.

Product purity. Glasteel will not contaminate or discolor materials you use in making synthetic resins. Nor will it act as a catalyst to set off undesired side reactions.

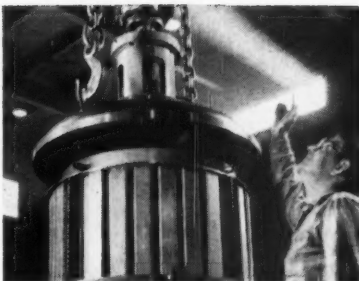
Naturally, you also get Glasteel's unmatched acid-alkali corrosion resistance, so you can project a long service life for this equipment.



Reduced downtime. Glasteel has an abrasion-resistant, smooth surface — smoother than the most highly polished metals. So even sticky substances don't adhere readily. What little does, you wash away quickly between batches, using the Pfaudler glassed Spray Rinse Valve. Thus you can expect to put through more product per day.

Lower cost. Glasteel costs less—significantly so—than the alloys you probably would consider in order to protect your product's purity. Just how much you can save will be apparent after you have had a chance to discuss your needs with one of our representatives.

Complete specifications and operating characteristics are covered in Bulletin 932. We'll be happy to send you a copy.



Does a WIPED FILM evaporator fit your process?

Yes, if you evaporate products that are

- (1) heat sensitive, or
- (2) highly viscous, or
- (3) low in thermal conductivity.

What makes the Pfaudler Wiped Film Evaporator so well suited is the *mechanically wiped* evaporating surface.

Four easy steps put F-C Glasteel Pipe* in your plant

Here's a corrosion-resistant, high-integrity lined pipe that's literally as easy as 1-2-3-4 to install.

Just take a section of Pfaudler F-C Glasteel Pipe (the F-C means "field cut") and cut to the length you want on a standard, dry abrasive cutoff wheel.

Next, thread—just as you see in the picture.

Third step: Fire-polish with a small, portable furnace. (You can get one from Pfaudler at modest cost that you will recover through the savings from a few installations.)

Then, thread on flange and belt sand to assure that gasket seat is flat and the flange connection seal-tight.

For complete details, ask for Bulletin 989.

Address all inquiries to our Pfaudler Division, Dept. CW-50, Rochester 3, N. Y.

*Patent applied for

FLUIDICS AROUND THE WORLD

Pfaudler Permutit is a world-wide company with manufacturing plants in: Germany, Great Britain, Canada, Mexico and Japan, as well as four plants in the U. S. A.

*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.

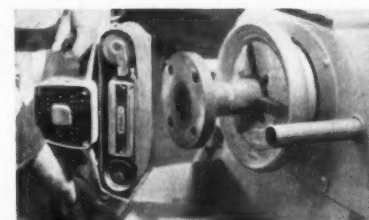
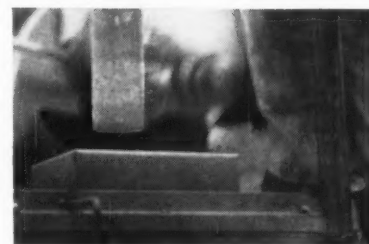
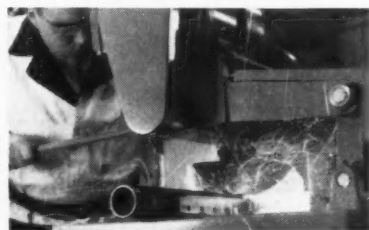
It works like this: Centrifugal force of an internal rotor (pictured at left) holds four free-floating wipers in contact with the evaporator wall. These wipers spread your product out over the entire evaporating surface in a *thin, uniform* film. Slots in each wiper prevent product "curl" forward of the wipers and accelerate product movement down the wall.

Since the heated wall is kept completely wet, you are sure of maximum heat transfer — a very important consideration with viscous and heat-sensitive materials, or those with low thermal conductivity.

Test, anyone? In our Test Center we maintain a 4-square-foot Wiped Film Evaporator for product evaluation studies.

Production units offer 4 to more than 100 square feet of evaporating areas. (That's a 50-square-foot one being assembled in the picture.)

We'd be happy to send you detailed specifications or provide further information about the test program.



PFAUDLER PERMUTIT INC.

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Bendix G-20

the new data processing system with the ORGANIZATION CHART concept

"Organization Chart" design in the Bendix G-20 means far faster, more efficient processing of scientific and business problems. The reason is clear:

The electronic manager of every data processing system is a computer. But most are poor "bosses" because they cannot delegate authority, or even supervise more than one operation at a time. Many computers run operations as complex as your own business, but with an inefficiency that you would never tolerate. Bendix engineers saw this shortcoming, and turned for a solution to the organization chart common to any well-managed business.

The G-20 Central Processor, or computer, has a staff of well-taught subordinates that can take instructions from the "boss" and go to work on their own, directing the workers that perform such tasks as reading punched paper tape and cards, looking up data on magnetic tape, and printing results. The "boss" can direct numerous subordinates, and without human intervention, schedule the work for each, making sure the most important work is done first. While the subordinates handle the details, the Central Processor is free to do the all-important computing.

This "organization chart" delegation of authority means several operations may be performed simultaneously, and with a minimum of equipment. The results? Call it "low cost per operation", or "just plain efficiency", but it is all the same... the Bendix G-20 gives you more performance per dollar than any other data processing system. The actual performance specifications listed at the right show the tremendous speed and power of the G-20. Components and design are the most modern in the industry today. System sizes can vary from a medium-scale system to a very large system with remote on-line or off-line sub-systems. Write for complete descriptive literature.

BENDIX AVIATION CORP., COMPUTER DIVISION Dept. 325 Los Angeles 45, California

SPECIFICATIONS:

MEMORY: Core, to 32,768 words in 4096 word modules.

EXECUTE +: 7 μ s. avg., fixed point, one-word precision. 13 μ s. avg., floating point, one-word precision.

EXECUTE X: 49 μ s. avg., fixed point, one-word precision. 49 μ s. avg., floating point, one-word precision.

ARITHMETIC: Built-in floating pt., 12 dec. digit precision.

CIRCUITRY: Solid-state; parallel; 2.5 kva.

PROGRAMMING: Symbolic assembler or algebraic compiler.

INPUT/OUTPUT: 165,000 char./second max., asynchronous.

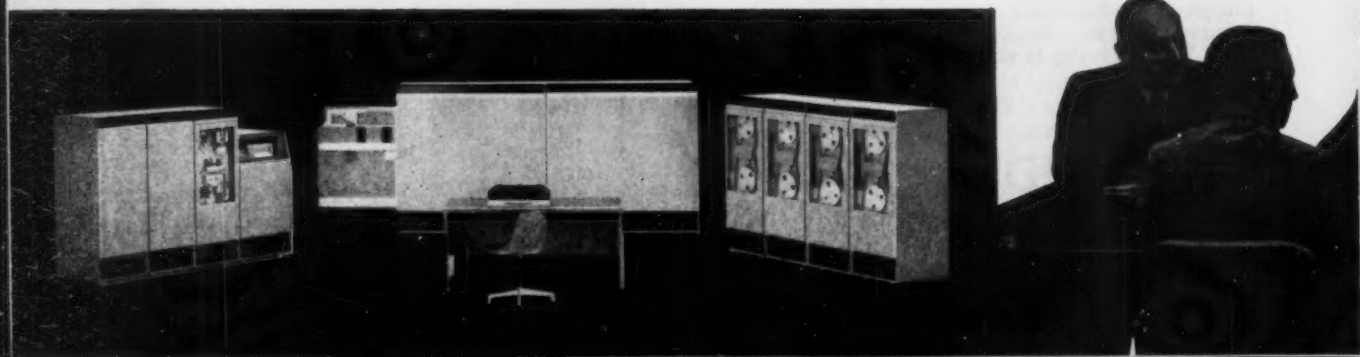
MAGNETIC TAPE: 120,000 decimal digit/second read-write.

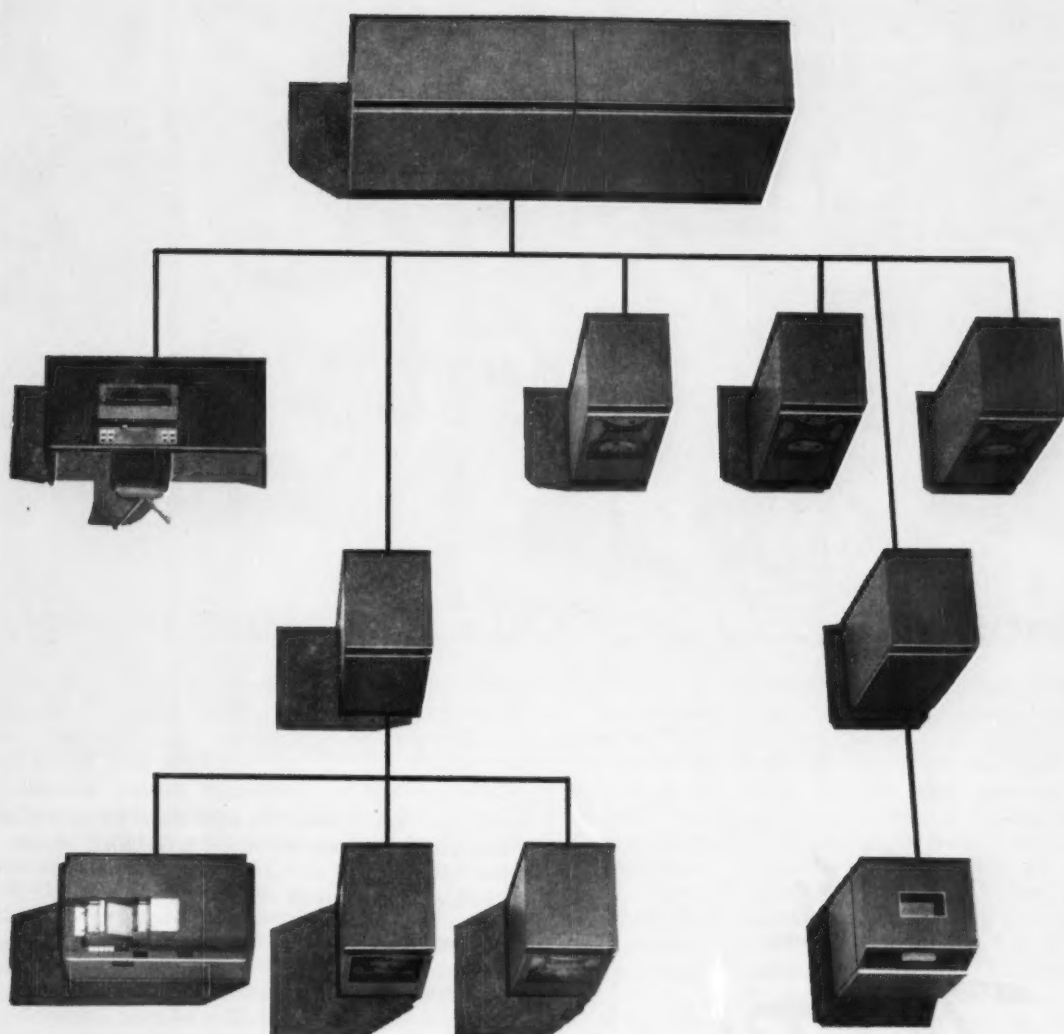
LINE PRINTERS: 600 lines per minute.

PUNCHED TAPE: 500 or more character/second readers. 100 or more character/second punches.

PUNCHED CARDS: Standard high-speed 80 column units.

CONTROL BUFFERS: 1024 character memory for data and commands. Controls transmission on-line or off-line.







It's The Rings

**THAT MAKE THE
DIFFERENCE —**



Another "Haul Mark" design from Standard is this stainless steel chemical transport, one of two delivered to McKenzie Tank Lines, Tallahassee, Florida.

A new and unique feature is the steam manifold connecting the pressure tight ring formers providing steam heating facilities with no weight penalty. Use of ring formers as steam conductors is a feature introduced and perfected by Standard.

Designed to carry various chemicals, these trailers have stainless inner shell and stainless jacket with 3" of glass fibre insulation between. Steam manifold lines are copper, installed to enable the operator to heat each compartment individually.

Standard Steel engineers will design a "Haul Mark" tank to meet your special requirements. A phone call or letter describing your problem will get immediate response.

Standard Steel Works, Inc.

- NORTH KANSAS CITY, MO.
- ENGLEWOOD, NEW JERSEY
- SPARTANBURG, SOUTH CAROLINA

1959

Unfired Pressure Vessels

Section
VIII



ASME Boiler and Pressure Vessel Code

Is extension of this pressure-vessel code needed?

Pro

- Code only covers pressures to 3,000 psi.; trend is to higher-pressure operation.
- Some unsafe pressure vessels are now in use; number will increase with high-pressure trend.
- Present technology can be used to formulate rules for areas not covered by present code.

Con

- Safety is no problem — only competent designers, fabricators are in high-pressure field.
- Conservative, hard-to-modify rules hamper design ingenuity, add to pressure-vessel cost.
- Vessel design not covered by present code is an art; rules can't be formulated, administered.

Pressure Builds in 3,000-psi. Code Discord

The American Society of Mechanical Engineers' (ASME) Boiler and Pressure Vessel Code sets standards of safe design and fabrication for much chemical process equipment. But it doesn't cover pressures above 3,000 psi. With high-pressure chemical processing on the increase (CW, July 18, '59, p. 45), the question of whether the code should be extended is sparking much concern—and controversy.

Points for and against extension (above)—studied intermittently by ASME since '46—are complex, as well as controversial. Result: no action, despite general agreement that a state of confusion exists as the code now stands.

Heightening the confusion is the opinion of some vessel makers that more-serious explosions occur at pressures below 3,000 psi. Reasoning: the amount of energy released, not the amount of pressure, is the troublesome element.

While proponents of the code extension don't directly dispute this statement, they claim such an argument is meaningless, because there are more code vessels than noncode vessels in use. It is the percentage of faulty vessels both within and outside the code that is important (actual figures aren't available).

Code for Confusion? Frequency of boiler explosions was the reason ASME set up a committee in 1911 to formulate a design safety code. The code, which has been changed over the years to keep pace with technological advances, has eliminated all but one of several hazardous conditions. The existing hazard stems from vessel designers and fabricators who use the code as a design manual, rather than as a guide to minimum construction requirements.

The remaining point of concern to the chemical industry is Section VIII, Rules for Construction of Unfired Pressure Vessels, which states: "The rules in this Section of the Code have been formulated on the basis of design principles and construction practices not exceeding 3,000 lbs./sq. in. Deviations from and additions to these rules should be considered for vessels designed for pressures exceeding 3,000 lbs./sq. in., to meet the requirements of design principles and construction practices applicable to these higher pressures."

The code is also vague in dealing with the effects of temperature gradient on maximum allowable wall stress. And for vessels operating above 3,000 psi, it doesn't cover special design and construction techniques needed to keep wall thicknesses within reason-

able limits. (Some of the special vessel types: multilayer, autofrettaged, compound cylinder.)

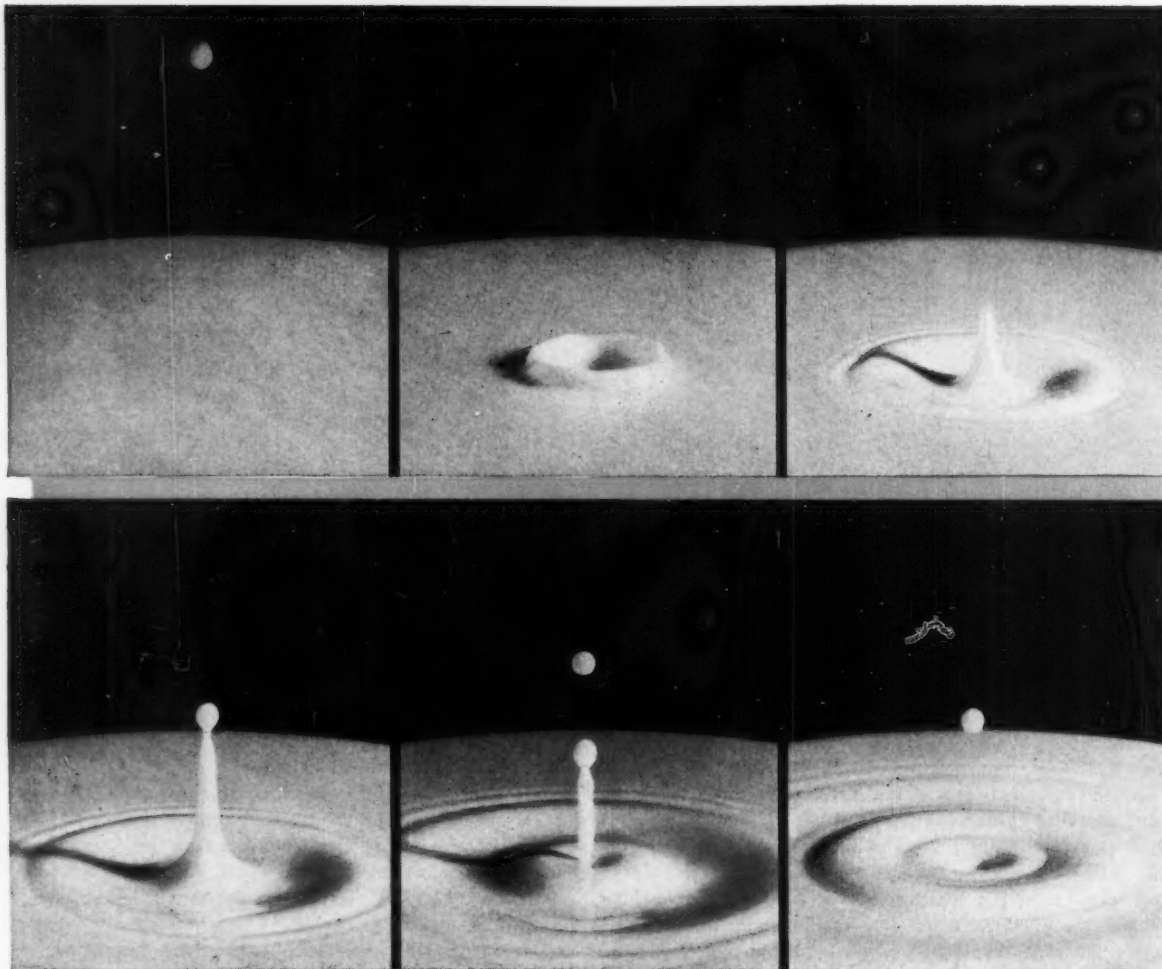
In practice, this means that the design engineer must convince inspecting authorities of the soundness of pressure-vessel design. Therefore, a meeting of the minds is the sole standard of vessel adequacy. The vessels are inspected by the chemical firm's insurance company but, in addition, inspections may be required by state and local authorities.

Confusion is furthered by many states having no laws whatsoever regarding pressure vessels. Even among the states using the ASME code, some refer to it *in toto*, others make changes and modifications. At least one state has completely written its own law, which closely follows the ASME code. Therefore any extension or clarification of the code would be subject to the vagaries present in today's Section VIII administration.

But regardless of difficulties in solving the inspection problem, the main concern of many CPI users is to obtain a safe vessel that will cause little or no hazard or embarrassment.

This group wants a code of some kind to protect it from the expense of failures. The companies would like to be spared the cost of hiring high-priced experts, currently necessary,

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daily growing more so.

While you may not particularly care what happens when a drop of latex falls into a vat (as illustrated in the sequence of pictures above), it's part of the knowledge that may well be of value in applying latex to your own product.

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**United
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NAUGATUCK CHEMICAL DIVISION

May 7, 1960 • Chemical Week

PRODUCTION

for checking the designs and engineering of the vessel fabricators.

But some fabricators and chemical companies with their own pressure-vessel experts argue that only competent and conscientious parties are in the business of buying and selling high-pressure equipment and that few, if any, unsafe vessels are being made.

"Not so," rejoin a few chemical companies, who say that "junk" is being made today and, as the use of high-pressure equipment increases, an already bad situation will be aggravated.

Fighting Cost: Some companies attack code extension on the basis of increased cost. They feel that an overly conservative and supposedly safe design code would add to cost, and point to the present code for examples. ASME policy now requires a safety factor of 4 (i.e., vessels must be designed for maximum allowable working membrane stress of $\frac{1}{4}$ the ultimate strength of the material). The overdesign safety factor is characterized by one observer as "... a fairly accurate measure of the ignorance attending pressure-vessel construction."

If this can be said about code vessels, they continue, why try to code and make generalizations in the still highly specialized high-pressure field that is constantly undergoing change and improvement. This would tie an engineering "art" to the slow pace of code modification. Advocates of code extension, however, think the art is sufficiently developed to make some code formulations possible.

They look to the work being done at Southwest Research Institute (San Antonio, Tex.), under the auspices of the Pressure Vessel Research Committee of the Welding Research Council and the Atomic Energy Commission, and to related studies being carried out at Ecole Polytechnique (Montreal), Lehigh University and the University of Illinois.

Work in refining Section VIII at Southwest Research concerns plastic fatigue behavior in large-size pressure vessels and the development of more rational methods of stress analysis for predicting the magnitude of significant stresses. One finding: plastic deformation is harmful in high-pressure containers, particularly when deformation is continuous.

Such research could provide the

technological basis for improvement and extension of the code, help cut safety factors and cost, as well.

As things stand, the existence of safe vessels outside the code rules depends on the ethical and professional competence of the fabricator and the ability of CPI purchasers to enforce their desire for safe and adequate vessels. On the other hand, any competitive urge of a fabricator to sell a cheaper vessel, and any need of CPI high-pressure-vessel purchasers to obtain the best possible price, would tend to frustrate this desire.

One company tells CHEMICAL WEEK it makes the fabricator responsible by contract not only for faults inherent in the vessel but for safe operation as well. Abuse of the vessel by the operator must be made impossible. This same company has hired vessel experts and it requires the submission of detailed thermal and mechanical stress analyses prior to the closing of a deal.

For chemical companies wishing to start processes requiring high-pressure vessels without fear of dangerous and costly embarrassment, the choice is: buy only from the most reputable and competent fabricators and hire specialists in high-pressure equipment, or find means of extending the ASME code in its present or altered form.

EQUIPMENT

Traced Pipe: Aluminum Co. of America (Pittsburgh, Pa.) is adding two-channeled, steam-traced aluminum piping to its one-channeled line to simplify, cut cost of recirculating heating fluids. The one-piece extruded pipe, called Duotrace, can be used to convey several products in one piping system. Sizes: 2-, 3- and 4-in.

Pressure Hose: Imperial Brass Mfg. Co. (6300 W. Howard St., Chicago 48) claims the performance of its new, polyester-reinforced polyamide pressure hose exceeds that of wire-braid rubber hose in many applications. The hose has a burst pressure of 9,000 to 12,000 psi., a service-temperature range from -40 to 225 F.

Temperature-Pressure Monitor: Texas Instruments Inc. (3609 Buffalo Speedway, Houston 6) is offering a new, digital readout system for monitoring temperatures in the 0-1400 F

How United States
Testing Company helps

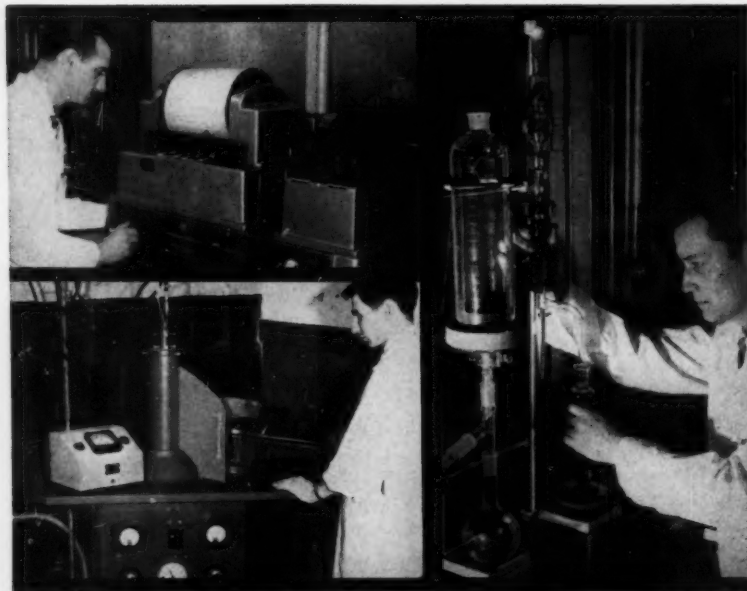
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PRODUCTION

range and pressures in the 0-10,000 psi. range. As many as 99 different temperature and pressure points may be monitored; accuracy: 1/2 to 2%.

Solid Density Measurement: Houston Instrument Corp. (P.O. Box 22234, Houston 27) is out with a new lightweight air-comparison pycnometer for measuring in one minute the density of powdered and granular materials. Densities are determined by measurement of the differential pressure between a reference cylinder and a cylinder containing the sample. The 14-lb. instrument can also be used to check the condition of porous catalysts, measure the percentage of components of different densities in a mixture.

Potted Switches: By prewiring and sealing conduit entrances with epoxy resin, the Square D Company (4041 North Richards St., Milwaukee 12) protects its new line of limit switches from liquids and other foreign materials. The company's Type AW (small precision) and Type T (heavy-duty) limit switches can be furnished in the new design.

Protective Suit: Chemingeers Inc., (4570 Brazil St., Los Angeles 39) is making a new protective suit, Dragon Skin, said to be resistant to all corrosive chemicals and oxidizers. The suit is made of fluoro-elastomers over Teflon cloth.

Motor Coupling: Link-Belt Company (Prudential Plaza, Chicago 1) is offering its type MC, geared flexible motor couplings with a new polypropylene cover that is resistant to acids, alkalies and solvents. The line also has a new type of spacer adapter, that can serve as a demountable rigid extension of the motor shaft.

Chloride-Ion Analyzer: Beckman Instruments' Scientific and Process Instruments Division (2500 Fullerton Road, Fullerton, Calif.) is now marketing its new chloride ion analyzer for continuous, automatic measurement in aqueous solutions. Range: 0.1 to 10,000 ppm. chloride-ion concentrations. Suggested applications: boiler-water monitoring, stream-pollution analysis.

Metering Pump: A positive-dis-

Chemical Week • May 7, 1960

From CIBA EPOXY Research...

CIBA

ARALDITE® EPOXY RESINS PROPERTIES AND APPLICATIONS

PROPERTIES TYPICAL VALUES	RESIN									
	ARALDITE 6000	ARALDITE 6001	ARALDITE 6002	ARALDITE 6003	ARALDITE 6004	ARALDITE 6005	ARALDITE 6006	ARALDITE 6007	ARALDITE 6008	ARALDITE 6009
Specific Gravity	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Viscosity at 25°C	100	100	100	100	100	100	100	100	100	100
Softening Point	120	120	120	120	120	120	120	120	120	120
Hardening Point	120	120	120	120	120	120	120	120	120	120
Modulus of Elasticity	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Tensile Strength	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Elongation	2	2	2	2	2	2	2	2	2	2
Impact Strength	10	10	10	10	10	10	10	10	10	10
Heat Resistance	150	150	150	150	150	150	150	150	150	150
Chemical Resistance	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Electrical Properties	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Adhesives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Body "Solders"	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Casting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coating and Sealing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Electrical	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Impregnating	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Laminating	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tooling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Equipment Finishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Marine Finishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Masonry Finishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Structural Steel Coatings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tank Coatings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Aircraft Finishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Appliance Primers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Automotive Primers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Can & Drum Linings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chemical Resistant Finishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Collapsible Tube Coatings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Furniture Finishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Metal Decorating Finishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pipe & Tank Linings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Concrete Floor Paints	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gym and Floor Varnishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sport Varnishes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Decorative Flooring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floor Topping—Industrial	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Printing Inks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Road Toppings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vinyl Stabilizers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

A LONG VIEW ON RESINS DEVELOPMENTS

The many ways in which CIBA Araldite® Epoxy Resins are used today point up one basic fact that should be of primary interest to all concerned with product development. The greatest era of usefulness for these versatile resins is still ahead!

Continuous study of the accelerated developments in the field by CIBA world-wide research is providing knowledge about epoxy resins properties and applications as objective as it is practical. It is the basis of all CIBA Technical Service to users and potential users of epoxy resins. "The Epoxy Building Block," a new CIBA Araldite Epoxy Resin booklet, contains detailed properties and application data covering each resin. This booklet may be obtained without obligation by returning the coupon below to CIBA Products Corporation, Fair Lawn, New Jersey.

✓ Shown here is a section of the 1960 Edition CIBA Araldite Epoxy Resins Properties and Applications Chart contained in the booklet "The Epoxy Building Block." It is a handy cross-reference source of latest information on epoxy resins for practical use in planning new product development and present product improvement.

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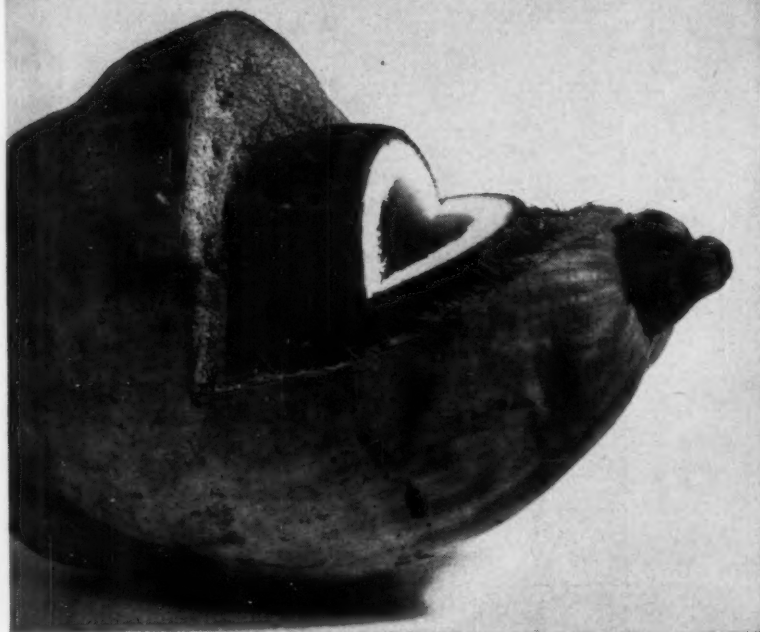
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Myristic	Coconut	Laurate	Coconate
		Myristate	*T.M. Reg.



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PRODUCTION

placement, motor-driven pump for metering at rates from 1 drop/5 minutes to 1 pint/minute is a new product of Bomar Laboratories Ltd. (Sheridan Road at Winona, Chicago 41). The pump has an electric timer, operates on 110 and 220 volts.

Thermal Wells: Fenwal Inc. (Pleasant St., Ashland, Mass.) is out with a new line of thermal wells for high-pressure service. Wells will withstand 3,000 psi. at 600 F, 2,000 psi. at 700 F. All are made of type-316 stainless steel.

Control System: The Vapor Recovery Systems Co. (2820 North Alameda St., Compton, Calif.) says its new, two-wire system for controlling pump motors, valve operators and similar equipment can cut wiring costs to 15-25% of that of conventional 7- to 9-wire systems. The control system uses only one wire between each control and field unit in addition to one common conductor to a number of units. No power source is required at the field end of the system.

Centrifugal Pump: Worthington Corp.'s Standard Pump Division (Harrison, N.J.) is out with a new line of centrifugal pumps with ductile iron casings and suction heads to overcome corrosion and thermal shock problems. In tests, the pump was heated to 300 C with an acetylene torch, then quenched with cold water without damage to the casing. Pumps are priced higher than cast-iron but lower than steel models.

Pyrex Piping Kit: Corning Glass Works (Corning, N.Y.) is offering a new, do-it-yourself beading kit for on-site fabrication of Pyrex piping. The kit includes all equipment needed to score, cut and bead the piping. Single cutting device and burner are used for all pipe sizes from 1 to 6 inches.

Pressure Transducer: Rosemount Engineering Co. (4900 West 78th St., Minneapolis 24) has introduced a new series of pressure transducers with improved accuracy. The transducers have a free-edged circular diaphragm that is mounted to isolate external thermal and mechanical strains. Full scale ranges: 1 to 100 psi. Sensitivity: 0.01% of full scale. Temperature range: -55 to 100 C.



What a difference a ray makes





What a difference a ray makes

The portion of sunlight with a wave length of about 0.000029 to 0.000033 centimeters is the region in the ultraviolet area of the spectrum that tans or burns the skin. It can't be detected by the eye but it can be felt. The remainder of the sunlight in the ultraviolet range is safe—in fact, beneficial.

Suntan and sunburn go hand in hand depending on exposure. Effective suntan lotions are sun screens. They protect the skin from sunburn . . . when applied frequently in sufficient quantity.

Certain chemicals in suntan lotions act as *filters* for the damaging rays and have no effect on harmless rays outside the 0.000029-0.000033 range.

These chemicals absorb the radiation which would burn, and most lotions will absorb radiation for at least two hours. *The real benefit of the lotions is that they permit sun worshippers to remain exposed to their deity for longer periods of time without being burned.*

The ultraviolet absorbing chemicals in many suntan lotions are derivatives of benzene, toluene and naphthalene—members of the fine family of USS Chemicals serving industry in thousands of ways.

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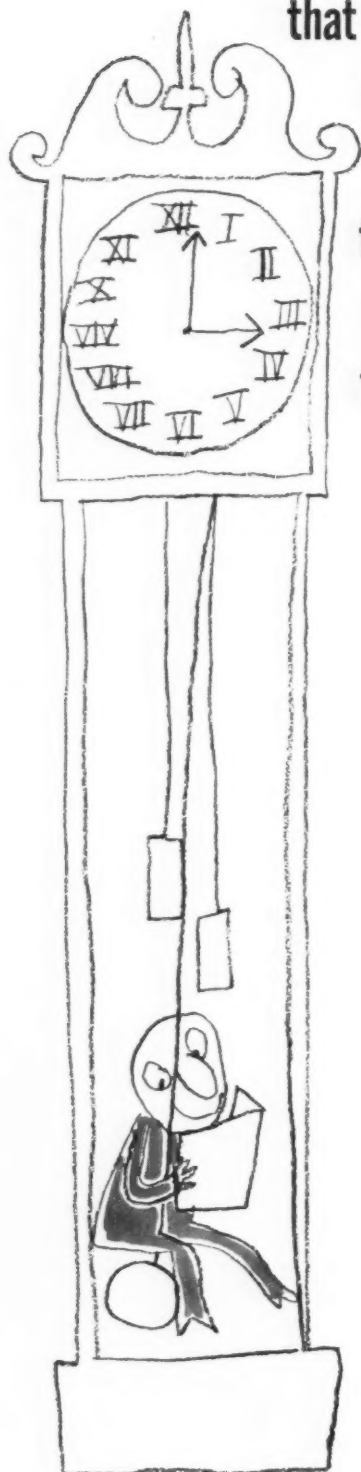


TRADE MARK

Chemicals



**Why is it
that the really
busiest men
always seem
to have the
most time
to read?**



Not long ago, we talked with the president of a huge international organization . . . an executive who commands more than fifty companies in 29 countries. He confessed to being an ardent reader of a certain McGraw-Hill magazine.

"When in the world do you ever find time to read it?" we asked him. "Why, it's right here in my briefcase," he said, and he reached over and pulled it out.

This shouldn't startle you. Important men recognize their responsibility to keep informed . . . make time in a businesslike way to read their own so pertinently edited McGraw-Hill publication. Instinctively they know that success, stature and specialized knowledge are bedfellows.

How well are you reading this, your own magazine? Are you a "skimmer" or a bonafide reader? There's more for you here than meets the eye . . . if you'll give your eye a real chance to explore.

And how about others in your department? Surely, there must be some qualified men-on-the-way-up whom you could help by passing along this issue . . . and with this particular page well marked. Wouldn't you like them to know, as you know, that . . .

Men who read more . . . earn more!

Technology

Newsletter

CHEMICAL WEEK

May 7, 1960

First controlled thrust variation of a solid-propellant rocket motor

has been accomplished in a test firing by Rocketdyne, a division of North American Aviation, Inc., at McGregor, Tex. In current solid-propellant rockets, thrust is constant from ignition to burnout. Controlled thrust variation provides greater accuracy and more precise control of missiles (e.g., aerial target drones, air-to-ground missiles) employing solid propellants. Control is based on a variable-area nozzle, which the company believes may be adapted to high performance ammonium perchlorate propellants.

•

A low-cost process for making titanium parts from powder

has been developed by Clevite Corp.'s Mechanical Research Division (Cleveland). High-density titanium parts can be turned out directly from the press without the customary secondary working (machining). Finished parts price has been cut from \$4-5/lb. to \$1.50-2/lb. Costs are tied closely to production quantities needed to amortize dies, also depend on intricacy of shape. Parts—typical are valve trim and seats—are now limited by the size of Clevite's presses to 35 sq. in. cross-sections.

•

Discovery of a new link between viruses and cancer

—potentially important in development of cancer vaccine—has been reported by University of California (Berkeley) researchers Ernest Kun, June Ayling and Benjamin Siegel. Avian pox virus was used to infect normal chick embryo tissue, producing the cell abnormalities (e.g., lactic acid accumulation) characteristic of cancer cells.

•

Vanadium pentoxide will be made from ferrophosphorus slag

in a plant being designed by Minerals Engineering Co. (Grand Junction, Colo.) at Salt Lake City, Utah. Based on "heat chemistry," the undisclosed process will use slag (currently wasted, except for limited fertilizer use) from Food Machinery and Chemical Corp.'s elemental phosphorus furnaces at Pocatello, Ida. Minerals' president, Blair Burnwell, Sr., says this is the first attempt in the U.S. to produce high-purity vanadium pentoxide from the phosphatic ores found in Utah, Wyoming, Idaho and Montana.

•

Normally obtained from vanadium or uranium ores, V_2O_5 is used at a 12-million-lbs./year rate in the U.S. as a starting material for other vanadium salts, gasoline catalysts, etc. But its development as a catalyst for controlling auto exhaust smog-forming hydrocarbons could spark new markets.

•

New catalysts for winnowing smog-formers from auto exhaust

have been developed by both Union Carbide and Arvin Industries, Inc. (Columbus, Ind.). But neither firm is disclosing details. Carbide combines direct combustion with catalytic oxidation to burn between 80-90% of the hydrocarbons and carbon monoxide, is continuing tests. Arvin

Technology Newsletter

(Continued)

says its catalyst is "unlike any of the ones reported by others working on this problem," reveals it does not become deactivated by lead additives in gasoline, is also testing further.

•
Ceramics progress, highlighted at last week's 62nd annual meeting of the American Ceramic Society (Columbus, Ohio), in Philadelphia, included these space-age applications:

- Ceramic coatings that preserve tungsten from oxidation up to 10 hours at 3000 F and above have been developed at the University of Illinois Dept. of Ceramic Engineering. Zircon bonded with high-temperature glass is the key to the coating system, essential in preserving high-melting (6150 F) tungsten's structural strength.

- A new approach to space-flight ceramics is claimed by Bendix Products Division (South Bend, Ind.) of Bendix Aircraft Corp. Bendix controls ablation (in space technology, this is controlled surface deterioration at high temperatures) of magnesium oxide, coating it with iron, nickel and chromium oxides. These evaporate preferentially at temperatures up to 4500 F, leaving a thin layer of molten magnesium oxide which protects the strong, sintered magnesium oxide base.

- Siliconized (silicon compound-coated) graphite shows the most promise of recently developed ceramic materials evaluated by Bell Aircraft Corp. (Buffalo, N.Y.) for leading edges in hypersonic aircraft. It edged out cermets, molybdenum disilicide, etc.

- Pyrolytic graphite (formed by pyrolysis of a gaseous hydrocarbon) is working out as a coating for unusually intricate shapes and designs, has been tested satisfactorily at temperatures as high as 6500 F.

•
New or improved industrial biochemical processes may stem from studies of bacteria under pressure, according to Soviet marine microbiologist Anatoli Kriss. A new winner of the Lenin Prize (awarded for outstanding scientific work), Kriss tells *CHEMICAL WEEK* his experiments establish that at 600 to 1,000 atmospheres pressure, bacteria undergo metabolism changes, sharply accelerate their ability to transform substances chemically.

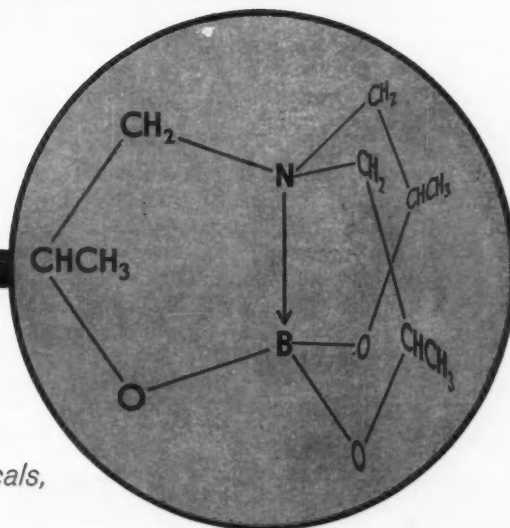
•
A three-year Defense Dept. study of free radicals (*CW*, May 4, '57, p. 63) has been completed by the National Bureau of Standards. NBS says the probe of short-lived atomic and molecular fragments has paved the way for research in several new areas, including low-temperature chemistry and the photochemistry of solids, resulted in advances in spectroscopic instrumentation and in X-ray and electron diffraction techniques. Industrial "guest workers" on the project came from Wyandotte Chemicals Corp., Ethyl Corp., Olin Mathieson Chemical Corp., California Research Corp., Humble Oil and Refining Co., Union Carbide Corp., and Sinclair Research Laboratories.



TRI-ISOPROPANOLAMINE BORATE

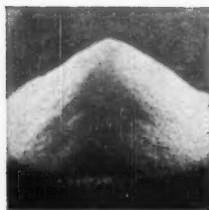
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like lots of other boron chemicals,
but different in one big way...*

boron-nitrogen interaction makes the difference!



TECHNICAL DATA

MOLECULAR WEIGHT..... 199
% BORON..... 5.44
MELTING POINT..... 153-156°C
BULK DENSITY..... 4.82 lb./gal.
SOLUBILITY: Soluble in water,
acetone, chloroform, benzene.

UNITED STATES BORAX & CHEMICAL CORPORATION



U. S. Borax Research Corporation



412 CRESCENT WAY, ANAHEIM, CALIFORNIA

See why ALCOA ALUMINUM makes a good design habit

Requirement: metal pipe and tube to insure corrosion-free fluid handling at low initial cost and minimum upkeep

Key to good design: specify low-cost, trouble-free tubular products of Alcoa Aluminum

The overpowering volume of pipe and tubing needed in the process industries makes it one of the biggest single material investments in most plants. Historically, the repair, maintenance and replacement of piping systems has been too, one of the biggest causes of an alarming increase in maintenance costs. Both factors make vital a clear understanding of the rather remarkable advantages of aluminum pipe and tube.

First of all, from a cost standpoint, aluminum is very frequently the lowest cost material suitable for a wide variety of applications in moving fluids through a plant. Consider, for example, the fact that the initial cost of aluminum may often average as much as 50 per cent less than that of admiralty for identical applications. Even greater savings apply when other metals such as stainless or mild steel are compared with aluminum.

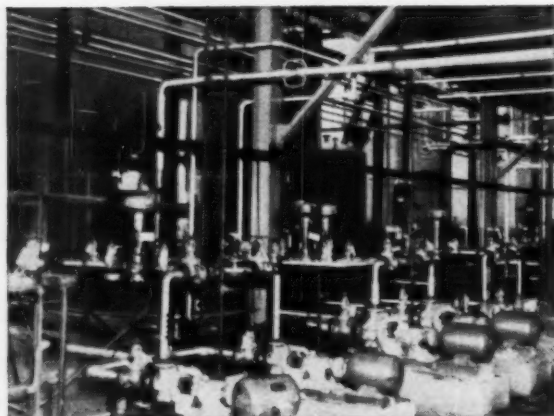
Beyond these initial cost savings, aluminum provides significant maintenance benefits. For instance, no other commonly used metal offers aluminum's great resistance to corrosion. And the corrosion resistance for specific

alloys exposed to particular environments can be determined from a substantial body of factual service data accumulated by ALCOA over the past 40-odd years.

It is hardly surprising that aluminum, in a variety of tubular forms, is gaining the confidence of more and more designers and builders in the process industries . . . as suggested by the aluminum applications described on these pages. ALCOA's engineers are anxious and willing to share their factual knowledge of aluminum which inspires this confidence. They are doing so through a series of engineering conferences being held this year in major cities around the country. Your local ALCOA sales office will be happy to furnish details.

You may also wish to avail yourself of the body of ALCOA literature which describes in technical detail the known performance characteristics of aluminum in a variety of process industries applications. Simply fill in and mail the coupon opposite.

World wide sales through ALCOA INTERNATIONAL, INC., 230 Park Avenue, New York 17, N.Y.



Process piping of Alcoa Aluminum is shown here in a system designed to handle liquid sugar. The natural corrosion resistance of aluminum prevents contamination of the syrup, insures long service life and prevents excessive maintenance. Its scavenging action reduces undesired heavy metal contamination, thereby improving the end product. And aluminum's low friction factor permits fast flow without excessive pumping costs.

This aluminum pipeline is shown being welded and laid in Lake Maracaibo, Venezuela. Aluminum—without special coatings—has proved highly suitable for this operation because it resists so well the corrosive attack of the brackish waters in the lake. Since no coating is required, the low initial cost of the aluminum has proved a significant benefit. The light weight of the aluminum pipe speeded laying operations, and it has no vulnerable coating which would require babying the pipe.





Alcoa Aluminum jacketing keeps the thermal insulation on these large diameter steam lines fully effective. The light, bright aluminum jacketing shields over 5½ miles of piping and insulation from rain, snow, dirt and ice while providing effective protection against a highly corrosive industrial-marine atmosphere.

New UNISTRENGTH pipe by Alcoa now makes it possible to design low-cost welded aluminum lines with uniform bending, bursting and tensile strength throughout their length. The secret is a reduction in wall thickness everywhere but at the ends where it is needed to overcome the local reduction in strength caused by the heat of welding. The result is aluminum piping which weighs up to 40% less but provides equivalent design strength.

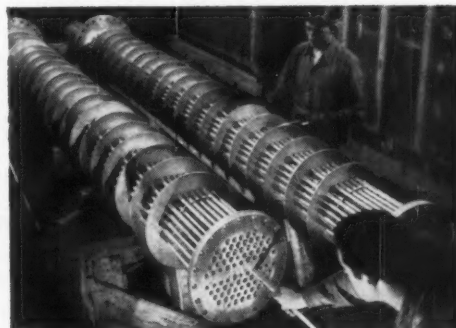


Alcoa UNITRACE is the light, strong, corrosion resistant pipe which provides steam and product passages in a single extruded unit. It has proved an excellent way to cut cost and improve the efficiency of steam traced lines—by eliminating costly external steam jackets or inefficient tracer tubes. Now a new product,

Alcoa DUOTRACE makes possible the same important benefits in steam traced systems where recirculation is desirable. As shown, DUOTRACE provides two trace passages plus the product passage in one extruded unit. Flange and Trace Cap fittings compatible with conventional piping are available for both UNITRACE and DUOTRACE.

Design Note: Consider UNITRACE and DUOTRACE as low-cost successors to both heat exchangers and preheaters.

Alcoa Aluminum heat exchanger tubing is frequently the lowest cost material with suitable corrosion resistance for a variety of heat transfer applications. Moreover, aluminum frequently displays significant extra benefits—as in this pair of aluminum oil-to-oil exchanger bundles for pre-heating vegetable oils. Here, the aluminum alloys have no catalytic effect on the oxidation of the vegetable oil.



For exciting drama watch
"ALCOA PRESENTS"
every Tuesday, ABC-TV,
and "ALCOA THEATRE"
alternate Mondays,
NBC-TV

Aluminum Company of America, 870-E Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries:

- | | |
|---|---|
| <input type="checkbox"/> 10197 Aluminum Pipe and Fittings | <input type="checkbox"/> 20437 Aluminum Alloy Heat Exchangers in the Process Industries |
| <input type="checkbox"/> 34-10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit | <input type="checkbox"/> 20272 Aluminum Alloys for Handling High Purity Water |
| <input type="checkbox"/> 10270 Alcoa Utilitube | <input type="checkbox"/> 21090 Resistance of Aluminum Alloys to Fresh Waters |
| <input type="checkbox"/> 10460 Process Industries Applications of Alcoa Aluminum | <input type="checkbox"/> 10130 Forming Alcoa Aluminum |
| <input type="checkbox"/> 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres | <input type="checkbox"/> 19416 Brazing Alcoa Aluminum |
| <input type="checkbox"/> 20265 Have You Tried Aluminum in Your Refinery? | <input type="checkbox"/> 10415 Welding Alcoa Aluminum |
| | <input type="checkbox"/> 19051 Alcoa Aluminum Handbook |

Name _____

Company _____

Title _____

Address _____

City _____

State _____

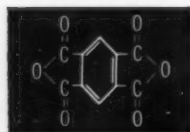
Du Pont Announces PMA and PMDA now available . . . from a new plant in commercial quantities at lower prices:

PMA
85¢
PER POUND

PMDA
\$1.00
PER POUND

These highly reactive, uniquely polyfunctional chemicals open the door to many interesting and profitable applications.

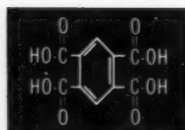
They are now available in commercial quantities, from Du Pont's new multimillion-pound plant in Gibbstown, N. J.



PMDA (pyromellitic dianhydride)

undergoes the wide variety of reactions generally characteristic of organic anhydrides and acids—esterification, amide, imide, and acid chloride formation, and many other useful syntheses. Because of its polyfunctionality and distinctive symmetrical structure it is a promising intermediate for the preparation of polymers, esterlubes, plasticizers, and other compounds and products having exceptional properties and utility.

PMDA is an effective cross-linking agent for epoxy resins, producing cured resins of outstanding thermal stability, electrical properties and chemical resistance.



PMA (pyromellitic acid) often can be used in place of PMDA in syntheses and for end-products where the pyromellitic structure is needed.

Although not quite so reactive as its dianhydride for some applications, PMA may be preferred because of its lower cost.

Opportunity to improve your products

Your research department may already be familiar with PMA and PMDA. Now their findings can be translated into actual improvements in your products—or new products—with the ready availability of these intermediates in commercial quantities at lower prices.

If you are not familiar with these tetrafunctional chemicals, a look at their properties and performance may turn up some exciting new developments for your products.

For detailed bulletins on either PMA or PMDA, write to Du Pont, Explosives Department, 6539-W Nemours Building, Wilmington 98, Delaware.

Prices quoted are f.o.b. Gibbstown, New Jersey, for material in standard containers and are subject to change without notice.



PMA | PMDA

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

ADMINISTRATION



Delegates at seminar in New York pay close attention to talk on India's aim to win new investors. CW PHOTO—LIONEL CRAWFORD

Getting India's Foreign Investment Pitch

India's increasing hunger for American investment capital is producing startling changes in that country's climate for private chemical investment. This was brought out at a seminar on India last week in New York, sponsored by the American Management Assn., as well as by a report of the latest U. S. Trade Mission and late dispatches from Chemical Week's correspondent in India.

Observers from industry—including representatives of over a dozen American chemical firms, such as Hercules, Allied Chemical, Vick, Koppers, Monsanto—heard reports at the seminar that India's business climate is now far more conducive to a fast expansion in industrial and private business than it has been to date. Major reasons behind the change: India's desperate need for funds to help it keep up with the exploding demands of its population, and its realization that public funds just aren't enough to do the job.

And, according to latest figures from the U. S. Bureau of Foreign Commerce, chemical process expansions are in the forefront of developments fostered by U. S. capital. Among eight new major investment projects disclosed publicly by Ameri-

can companies in '59 are plants to make industrial adhesives; cortisone and other pharmaceutical products; rayon, nylon and other filament yarns; an aluminum plant and related bauxite facilities; a synthetic rubber plant; and a mill to produce paper from bagasse.

Fears: In spite of American interest, though, company delegates reflected the uneasy fear that still abides in U. S. management minds about the socialistic policies of India with the attendant possibilities of government control of business, or expropriation. During discussion sessions the delegates aired their doubts, and received explanations and assurances from Indian government representatives as well as other investors in India.

Answers tended to confirm what has been forecast before (*CW*, June 13, '59, p. 27), i.e., despite a doctrinaire attitude at the outset of India's independence, the realities of its needs would force it to turn increasingly away from theories.

Thus, the government's early suspicious and stiffnecked attitude toward private investment has changed to a growing awareness that the need for capital is so urgent and great that any and all sources must be

tapped. This, coupled with growing population and the relaxation of barriers to non-British investment, point toward tremendous future possibilities. Of course, some hurdles remain.

Incentives: But the deterrents are not insurmountable, particularly with incentives such as may be found in India's third five-year plan now being drawn up. With only 14 months more to go before the plan is put into operation, the government hopes soon to put before the public a rough sketch of what the economy will look like in '66. Although official announcements haven't yet been made, it's possible to put together a comprehensive chemical outlook:

- **Cement:** Estimated output of cement by early '61 is about 10 million tons. Target for the third plan is likely to be about 16 to 20 million tons, involving an additional investment of about \$150 million.

- **Fertilizers:** With large-scale expansion of food output as one of the main objectives, Indian officials are planning to boost fertilizer output eightfold. By the end of the second plan, next year, India will be producing about 130,000 tons of nitrogen. Target for '66 is about 1.2 million tons of nitrogen and 250,000 tons of

ADMINISTRATION

phosphate equivalent. An investment of about \$350 million is forecast to fulfill fertilizer needs of the third plan, and demand for fertilizers is expected to rise steeply during the fourth and fifth plans.

Earlier plans for keeping the fertilizer program entirely state-owned have been altered. It's now open to private investors, and provides one of the best opportunities for U. S. companies.

- **Sulfuric Acid:** Present production of sulfuric acid is about 500,000 tons. Although details of the '66 target are not available, it will likely call for about 1.3 million tons, requiring an additional investment of about \$40 million.

- **Caustic Soda:** By the beginning of the third plan, in '61, annual production of caustic soda is expected to be about 145,000 tons. Since demand has been growing about 15%/year, the '66 target will likely be 350,000 tons, involving an expenditure of \$30 million.

- **Soda Ash:** Target for '66 is expected to be about 700,000 tons, based on an estimate for '61 of about 230,000 tons. Additional investment required will be about \$20 million.

- **Paper:** Revised estimates of '61 production — expansion hasn't been as fast as originally anticipated — call for 400,000 tons. Expansion of production to 700,000 tons by '66 will involve an expenditure of about \$150 million.

- **Oil:** India's crude oil output by the beginning of the third plan is expected to total three million to four million tons. Estimates for the third-year plan — dependent largely, of course, on the success of exploration and drilling endeavors—call for 11 million tons.

Other Chemicals: Most recent estimates, but still highly tentative, call for an increase in demand for dyestuffs of about 15%/year in the third plan ('58 output was 8.5 million lbs.); 120 tons of intermediate chemicals by '66, of which 80 tons will come from a state-owned plant being built by Farbenfabriken Bayer for completion in '64; tentative estimates for pharmaceutical drugs of '65-'66 indicate an additional investment of between \$160 million and \$200 million.

Total investment in the plastics industry is now about \$32 million.

To keep up with world trends, the Indian Planning Commission figures an additional investment of up to \$80 million is needed to cover development of resin raw materials, fabricating plants, resin research and technology.

LABOR

Union Strife: An interunion war has broken out between United Mine Workers, District 50, and Oil, Chemical & Atomic Workers at the Niagara Falls, N.Y., Carborundum Co. plant. At stake are bargaining rights—now held by OCAW—for about 2,500 employees UMW seeks to win. UMW, in a letter to employees, charges OCAW with being similar to a "company controlled union" and labels it "misguided." (OCAW has represented Carborundum employees for nearly 10 years, having wrested leadership from UMW.)

Prime target of UMW is the current five-year contract between OCAW and Carborundum. UMW claims OCAW sold out members in July '58, when it agreed to the contract in order to keep projected expansions near Niagara Falls. The company had said that it would put a planned \$10-million plant elsewhere than in the high-cost Niagara area, unless the union agreed to help keep costs down.

OCAW says this is a retaliatory campaign waged by UMW because it has lost several plants in central New York to OCAW in recent years.

• **Alloy Agreement:** Titanium Alloys Manufacturing Division of National Lead Co., at Niagara Falls, N.Y., and Local 12-230, United Mine Workers, District 50, have agreed on a two-year contract providing a 10¢/hour wage increase for production and maintenance workers. In addition, the contract provides an 11¢/hour wage increase in lieu of an incentive bonus that had been in effect. A wage-reopener clause calls for new wage discussions in one year, and for discussion of pensions and life insurance. Other provisions: job classification rate changes ranging from 4-10¢/hour, a 1¢/hour increase on continuous-operation shift differentials, and an additional holiday in the second year of the contract.

• **Turnabout:** After apparently agree-

ing to a wage increase of 10¢/hour, employees at the Acheson Dispersed Pigments Co. plant in West Orange, Tex., turned about, went out on strike. At issue, according to reports, was whether or not there was agreement on a contract provision about contributions toward insurance and sick leave programs. Local 4-23, OCAW, contends management altered its proposal from that agreed on in earlier meetings.

KEY CHANGES

Henry F. Scheetz, Jr. to chairman of the board, The Brown Company (Boston).

Dave Center to chairman of the board; **Nat Sandler** to president; **A. E. Garber** to vice-president, treasurer; **Mills B. Lane, Jr.**, **W. H. Solomon**, **Alexander Yearly, IV**, **J. F. Zott**, all to board of directors; Oxford Chemical Corp. (Atlanta).

John T. Dorrance, Jr., **Richard G. Folsom**, **August J. Thoma** to board of directors, Air Reduction Co., Inc. (New York).

George P. MacNichol, Jr., to chief executive officer and **Curtis W. Davis** to executive vice-president, Libbey-Owens-Ford (Toledo).

V. C. Henrich to board of directors, Rohm & Haas Co. (Philadelphia).

John J. Smith to board of directors, Johnson & Johnson (New Brunswick, N. J.).

Cyril G. Fox to chairman of the board and **David C. Melnicoff** to vice-president, administration, Fels & Co. (Philadelphia).

C. Harry Burgess to vice-president, exploration, Kennecott Copper Corp. (New York).

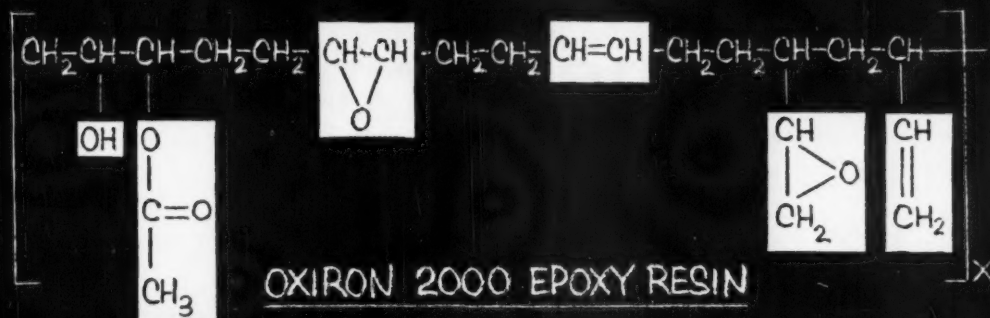
William P. Mackay to board of directors, The High Point Chemical Co., Inc. (Port Washington, N.Y.).

William L. Loving to vice-president, Godfrey L. Cabot, Inc. (Boston).

W. H. Woods to vice-president, Texas Gas Exploration Corp. (Houston).

Max C. Powell to vice-president, general manager, Owens-Illinois International, SA, new subsidiary of Owens-Illinois Glass Co. (Toledo).

FMC ANNOUNCES VERSATILE NEW EPOXY RESINS



Schematic formula of OXIRON Resins

OXIRON Epoxy Resins Offer Multiple Reaction Sites Plus Unique Vinyl Reactivity

OXIRON 2000 Series Resins are Highly Reactive.

The unusual molecule of FMC OXIRON Resins affords 10 or more reaction sites. They can be cured through reactive double bonds as well as epoxy and hydroxyl groups. Multiple epoxy groups are located at external positions and internally along the hydrocarbon backbone.

Unlike conventional epichlorohydrin epoxies, OXIRON Resins are epoxidized polyolefins. Because of their unusual combination of properties, they offer many new application possibilities.

OXIRON Resins Offer the Following Advantages:

Novel Cure: Can be peroxide cured through reactive double bonds as well as with conventional epoxy curing agents—high reactivity with anhydrides and dibasic acids at low temperature—increased pot life with polyamine cures—reactive with a wide variety of other curing agents, e.g., polyphenols, Lewis-type catalysts, polysulfides.

Economy: Low-cost curing agents may be used in high proportions.

Low Density: 20% lighter than ordinary epoxies—cured resins likewise have lower density.

Outstanding Chemical and Electrical Resistance: Excellent resistance to alkalis, acids, and solvents—cured resins have good electrical properties.

Superior High Temperature Performance: Combination peroxide and anhydride cures give high heat distortion point resins. The unique flatness of the heat distortion curves of OXIRON Resins translates to acceptability for practical use at temperatures ranging far above the heat distortion point itself. OXIRON Resins show superior high temperature aging.

Send for our *FMC Epoxy Data Booklet* which describes OXIRON 2000, 2001 and 2002 in detail, contains curing information and gives suggested uses. After deciding which resin will best suit your needs, we will supply laboratory samples upon request.



FOOD MACHINERY AND CHEMICAL CORPORATION
Epoxy Department (CW-5)

161 East 42nd Street, New York 17, N. Y.

A report from Hercules Powder Company on the performance of **ALTAIR**

The X248—named by NASA the Altair—has been called upon 13 times to put up a space vehicle and 13 times it has done so. It has never failed.

The Altair is the most reliable and most advanced solid propellant rocket engine for space research available to the free world.

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Javelin I
Explorer VI, "Paddlewheel"
Vanguard III
"Shot-Put" I
Argo I
Javelin III
"Shot-Put" II
Argo II
"Shot-Put" III
Pioneer V
Tiros
"Shot-Put" IV

Chemical Propulsion Division, Hercules Powder Company developed and produced the double-base solid propellant, high altitude rocket Altair at the Navy Bureau of Weapons-owned, Hercules-operated Allegany Ballistics Laboratory. The engine case is Spiralloy® continuous filament-wound, resin-bonded glass fiber made by Hercules' Young Development Division; it provides the highest strength-to-weight ratio of known materials, thus enabling a greater weight propellant or "more push per pound" in the finished rocket motor. The significance of this performance is obvious to all who are vitally concerned with the missile-rocket program.

Explosives Department
HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington, Delaware



XP60-1

Market Newsletter

CHEMICAL WEEK

May 7, 1960

Polyvinyl chloride demand may reach 2 billion lbs./year by 1970.

So said Cary Chemicals President George Blasius at last week's dedication of the firm's new PVC facilities. Additions bring Cary's capacity at its Flemington, N.J., plant to 50 million lbs./year.

Blasius also indicated that Cary's output may fall short of supplying requirements by late this year, that it was thinking of a further doubling of polymer capacity. The company is presently planning a new phase of growth that will require some \$25 million additional capital investments for polymers and "chemicals used in the growing plastics industry."

Last year Cary acquired Great Bay Chemicals & Plastics (East Brunswick, N.J.) and Regency Plastics (Woodside, N.Y.), as steps toward a completely integrated operation.

•
A 75% price slash on Du Pont's Freon-C318 (octafluorocyclobutane) brings cost of the fluorocarbon down from \$20/lb. to prices ranging from \$6.65/lb. in 14-lb. cylinders to \$4.84/lb. in 2,200-lb. tanks. Reason for cut: switch from pilot-plant to semicommercial production.

The chemically inert dry gas has a high dielectric strength, is used in manufacture of electrical equipment; it may also find applications as refrigerant in evaporating cooling equipment and as aerosol propellant.

•
The fluorocarbon price cut is part of a broad market development program on fluorine chemicals pushed by Du Pont in face of probable step-up of competition by other firms (*CW*, Jan. 16, p. 65). A common tactic: substantial and frequent price reductions.

•
CPI statistics users seeking improved government data on chemical and allied products industries (*see p. 83*) may have trouble finding responsive ears in Congress, according to the Federal Statistics Users' Conference in Washington. Lawmakers are examining proposals for new and expanded programs for fiscal-year '61.

Congress approved a \$3-million appropriation increase, to \$39.1 million, for '60 programs (results available to users in '61); but FSUC thinks there may be hedging on a proposed second \$3-million boost that would bring total '61 budget to about \$42 million. What Congress does is of concern to the CPI even if exclusively chemical reporting remains unaffected.

•
First of several shipments of Cuban blackstrap molasses has arrived at Niagara Falls via the St. Lawrence Seaway. The 5,000-tons

Market Newsletter

(Continued)

shipment was to Industrial Molasses Corp.; at least 25,000 tons more is expected, if political disturbances in Cuba do not disrupt loadings.

But the shipment could have further significance. Industrial Molasses has invited Hooker Chemical officials to visit its freighter, *Amphitrite*. Hooker might export via tankers traveling the Seaway. No definite commitments have been made, however.

•

New, medium-density Tenite polyethylene film, introduced by Eastman Chemical Products Co., at the recent National Packaging Exposition (*CW*, April 16, p. 116), is being tested by several cigarette makers as a possible overwrap. Tenite, comparable in price to cellophane, is claimed to offer greater coverage at usual packaging thicknesses, and operate on standard high-speed cigarette wrapping machines. The film is already in use for wrapping bread, paper napkins and soft goods.

Further indicating the packaging role polyethylene is expected to play, Union Carbide Plastics Co.'s T. W. Sharp, product marketing director, notes that sales of machinery for overwrapping with polyethylene film are running at "good" levels, should contribute significantly to total film sales in '60.

•

Cord strapping is first product of American Viscose Corp.'s (Philadelphia) new industrial packaging department. It's called Avistrap, is made of high-tenacity rayon cord, features economy, ease of handling and safety. The patent-pending product weighs one-quarter to one-seventh as much as steel strapping of comparable strength—a coil of Avistrap, complete with disposable spool, in a yardage equal to a 100-lb. coil of steel strap, weighs about 21 lbs., and a 1,000-yd. spool of heavy-duty Avistrap measures 13½ in. in diameter, is 6 ft. wide, weighs one-fifth as much as a comparable amount of steel strap.

•

Trade expectations of a price cut on polyvinyl alcohol because of mounting overcapacity are discounted by three firms that have just completed capacity boosts (*CW*, Oct. 31, p. 53).

Air Reduction is now shaking down its new, 20-million-lbs./year plant at Calvert City, Ky., expects to have it fully onstream in a few months. Company spokesmen say no price cuts are expected.

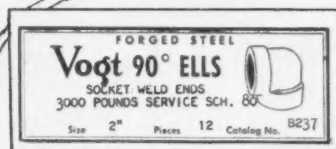
Borden last month completed a PVA expansion to 8 million lbs./year at Leominster, Mass. Borden also denies price-cutting plans, is unconcerned about general overcapacity because its own output will be used mainly for captive production of water-soluble Lemoflex resin (*see* p. 89).

Shawinigan Resins recently completed a capacity-doubling to an estimated 10 million lbs./year at Springfield, Mass. The firm uses some PVA captively, sells most. Although price cuts are not ruled out completely, Shawinigan says, they are considered unlikely in the near future.



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**FORGED STEEL
FITTINGS, FLANGES
and UNIONS**



Complete product identification and data on label attached to carton.



Voegt modular designed cartons give added handling and storage space economies. All dimensions are in multiples of 3 inches.



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- 1 Easy Inventory Identification
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Handling and inventory costs are held to a minimum with Voegt modular packaged forged steel fittings, flanges, and unions. The small cartons, of restricted weight, are appreciated by the distributor and user alike for their easy handling and the protection given the products against damage.

The label attached to each carton completely describes and pictures the product and gives the quantity, size, end type, pressure, and catalog number.

Write for Folder PF-1 for complete data on quantities and weights of the items as packaged in various sizes of cartons.

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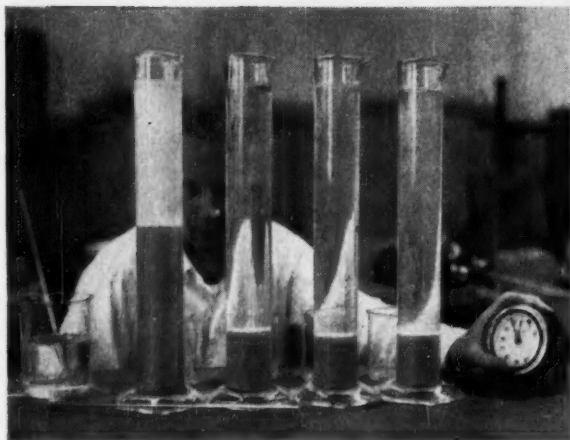
CYANAMID

Chemical Newsfront



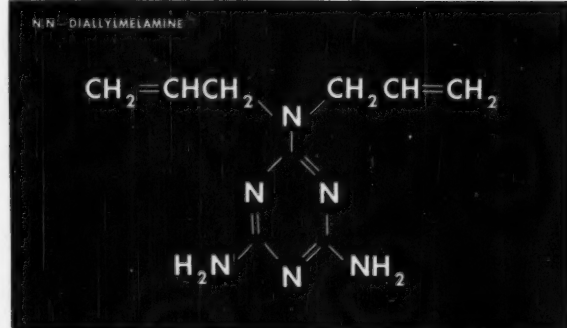
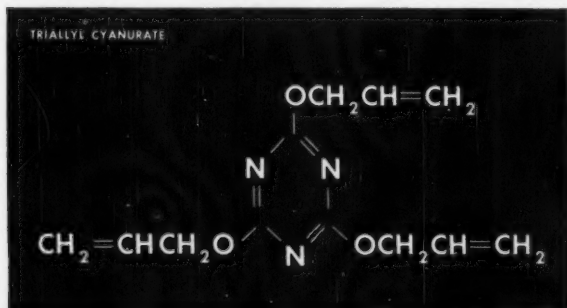
PAPER PADDLE WHEELER demonstrates the remarkable wet-strength properties of Kraft paper when treated with Cyanamid's MELOSTRENGTH® Resin. A boon to housewives, Melostrength holds shopping bags strong and firm even when carrying frozen foods and wet groceries. Melostrength also helps to keep bags intact in rain and snow—makes them more effective for re-use in the home. Other applications of Melostrength include its use in paper towels, photographic papers, auto seat covers and facial tissues.

(Paper Chemicals Department)



SOIL-TESTING—NEW ROLE FOR FLOCCULANTS. Cyanamid flocculants, already widely used in the treatment of ore and coal suspensions, have found new usefulness in soil-testing. Addition of equal amounts of SUPERFLOC 16® Flocculant and AEROFLOC® 3171 Flocculant to extracting solutions (1 part mixture to 10,000 parts soil) eliminates filtration in preparing soil samples for determining availability of inorganic plant growth nutrients. With the new flocculating method, extracts can be prepared more rapidly and are clearer than those obtained by filtration. Water clarification, waste treatment and chemical processing are other potential applications for these flocculants. For complete information on these and other AEROFLOC® Reagents, send for the new booklet, "Cyanamid Flocculants."

(Explosives and Mining Chemicals Department)



NEW LIGHT ON DAM & TAC. Monomer reactivity ratios allow predictions of the probable composition of copolymers in terms of the monomers originally present. A data sheet—just published by Cyanamid—sheds new light on the reactivity of triallyl cyanurate and diallylmelamine. There is also data on the actual composition which might be expected in certain polymer systems as well as typical copolymerization and prepolymerization techniques. Write for your copy.

(Market Development Department)

CYANAMID

AMERICAN CYANAMID COMPANY
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

May 7, 1960 • Chemical Week



CHEMISTRY SERVES A QUEEN. North Carolina's beauty queen wore a formal presentation gown of dazzling white—and Cyanamid is proud that its textile brightener, CALCOFLUOR® White ST, made it that way. The cloth was Cone Mills' "Lurvel," a fine, velvety cotton, velour-type fabric. The gown itself was part of an "all North Carolina wardrobe" produced through the joint efforts of the state's leading designers, manufacturers and retailers. As many textile men know, Calcofluor White brighteners, easily applied during normal textile processing, add exceptional brilliance to whites and pastels—brighten the sales potential of many products.

(Dyes Department)

For further information on products in this advertisement wire, phone—or mail this coupon to:

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**MORE CANDLES
MADE TODAY
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Stearic Acid is an important ingredient of candles. And, strange as it may seem, more candles are made today than 50 years ago. Stearic Acid imparts dripless, non-bending, and better burning characteristics to candles, keeps white candles from yellowing, helps colored candles keep their true shade.

**FATTY ACIDS
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Titre	129.0° — 129.9°F.	39.2° — 42.8°F.
Color 1" Lovibond Red*	0.5 max.	1 max.
Color 1" Lovibond Yellow*	2.0 max.	10 max.
Unsaponifiable		1.5% max.
Saponification Value	209 — 212	198 — 203
Acid Value	208 — 211	197 — 202
% F.F.A. as Oleic Acid		99 min.
Iodine Value (WIJS)	4.5 — 6.5	94 max.
Refractive Index 50°C. (Av.)		1.4500
*5 1/4" cell for Groco 54		

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MARKETS

What CMRA Members Think of Government Publications

Title	Number of users	% satisfied	% dissatisfied	% users dissatisfied for specific reasons					
				Publishes too late	Too infrequent	Lack of detail	Sources unidentified	No estimate of probable error	Other reasons*
Synthetic Organic Chemicals Facts for Industry	204	38	62	39	5	29	4	17	16
Census of Manufactures	133	44	56	24	7	35	5	15	8
Imports & Exports (FT 110 & FT 410)	65	31	69	46	34	26	8	14	5
Chemical & Rubber Industry Report	56	48	52	18	0	34	2	9	9
	53	75	25	8	2	13	4	8	4
Minerals Yearbook	45	44	56	49	7	16	4	18	2
Survey of Current Business	42	86	14	12	0	5	0	5	0
Mineral Industry Surveys	33	73	27	12	3	12	3	9	6
Statistical Abstracts	24	71	29	25	4	4	8	4	0
Agricultural Statistics	16	62	38	19	6	12	19	12	0
Annual Survey of Manufactures	16	25	75	56	12	38	6	6	6
Business Statistics	12	67	33	8	8	33	8	17	0
The Fats & Oils Situation	12	58	42	8	0	33	0	8	0
The Fertilizer Situation	10	60	40	10	0	20	0	10	0
Federal Reserve Bulletin	8	75	25	12	0	0	0	0	12
Foreign Commerce Weekly	8	88	12	0	0	12	0	12	0
Distribution Data Guide	7	86	14	0	0	14	0	0	0
Census of Business	6	17	83	50	0	50	33	17	0
Economic Indicators	6	83	17	17	0	17	0	0	0
Employment & Earnings	6	33	67	50	0	33	0	33	0
Foreign Agriculture Circular	5	60	40	0	0	20	0	20	0
Alcohol & Tobacco Statistics	4	25	75	75	0	0	0	0	0
Census of Agriculture	4	25	75	50	0	25	0	0	25
Construction Review	4	25	75	0	0	25	0	0	25
Consumption of Commercial Fertilizers	4	0	100	75	25	0	0	0	0
Current Population Reports	4	100	0	0	0	0	0	0	0
Molasses Market News	4	50	50	0	0	25	0	25	0
The Pesticide Situation	4	0	100	25	25	75	0	25	0
Crop Production - Annual Summary	3	67	33	0	0	33	33	33	0
Mineral Facts & Problems	3	100	0	0	0	0	0	0	0

*Includes: inadequate coverage, extent of coverage not indicated, no comparability with other sources or earlier data, inaccuracy, incompleteness, inadequate or inappropriate organization of material.

Needed: More and Better CPI Statistics

The statistical tools of CPI market researchers must be continually sharpened to cope with problems posed by increasingly complex and competitive business conditions. The launching of several efforts to discover new data sources — and improve traditional ones — points up CPI market analysts' mounting concern in this area.

This concern is being translated into significant action.

Just last week, for example, the Chemists' Club Library in New York sponsored a statistics session for an overflow crowd of fact-gatherers. At the same time, the Eastern Regional Industrial Marketing Committee of the American Marketing Assn. held

its own data-probing session in Philadelphia.

But perhaps the most significant development concerning statistics was a dissection of the government statistics situation by the Chemical Market Research Assn., which recently completed a questionnaire study of its membership (see table above).

MARKETS

CMRA's questionnaire was answered by 270 members (a 42% return), representing 131 chemical and allied companies, consultants, research institutions, investment houses, engineering contractors, etc.

General importance of government statistics is underscored by the fact that more than 70% of respondents say they use federal sources frequently, more than 50% say these are primary sources of market data. This indicates that the CPI is more concerned with and dependent on federal statistics than is the American business community as a whole; an estimated 75% of all U.S. firms do not normally use these figures (*CW*, Nov. 7, '59, p. 33).

Some 90 different government publications or series of publications are named as sources of information by CMRA members; 30 are considered especially important (*see table*, p. 83). Despite obvious usefulness of federal statistics, however, more than 50% of respondents were dissatisfied with available data. Key reasons: lateness, insufficient detail, uncertain reliability.

The respondents, however, do more than criticize; there are constructive suggestions and pleas for additional data. For example, many list specific items or groups of items for which they would like to see monthly production data; others ask for broader coverage of existing classifications. And emphasis is put on the need for more data on end-uses of plastics and resins.

There's apparently need also for more monthly sales data on products not currently reported — especially in broad classes such as "inorganics."

Source of considerable frustration to market researchers is use of so-called "basket" categories which lump statistical data for many relatively small uses; this criticism is aimed most often at the Tariff Commission's "Synthetic Organic Chemicals" report and then at the FT 110 and FT 410 import and export reports.

Other modifications asked by respondents: regional production, sales and consumption data; sources of data or extent of industry coverage; capacity data for plants and industries; data for captive consumption; prices; data on inventories of individual products, etc.

Tariff Highlighted: The CMRA questionnaire also clearly reveals importance of the Tariff Commission's annual report (Synthetic Organic Chemicals) as source of market data. As in the case of general suggestions for improvements, many urge expanded coverage.

Interest in the Tariff report underscores concern of CPI marketers, last year, when the U.S. Budget Bureau considered transfer of organic chemicals reporting from the Tariff Commission to the Bureau of Census (*CW*, Nov. 7, '59, p. 33; *CW Market Newsletters*, Oct. 24 and Nov. 21, '59). Incidentally, such transfer would have eliminated listing of reporting firms — a service that many CMRA members indicate should be strengthened. In any case the Budget Bureau's continued inactivity on the proposal indicates that Tariff will probably keep on handling statistics on organic chemicals.

General Improvements: Other suggestions for bettering government statistics include: better identification of captive consumption of chemicals; single, concise listing of all government publications; elimination of duplication; improved reporting of rules and methods; emphasis of sales data; improved accuracy; coordination of all government statistics by a single agency.

Many hope for expanded data on foreign chemical production; more detailed import/export data; reporting of alcohol and tobacco statistics on a calendar-year basis; broader services enabling statistics users to buy, from federal agencies, "more pertinent detail."

CMRA has sent results of the study to the Federal Statistics Users' Conference* (as well as to its own membership) for comment and review by appropriate government officials. Their reports, in turn, should help point up those areas in which improvements might be expected first.

New York Session: At the Chemists' Club, in New York, experts representing the U.S., UN and the CPI explained how market researchers can best use various information sources, underscored the role of general and company libraries.

* FSUC operates in Washington, D.C., is concerned with improving usefulness of government statistics; FSUC membership now includes companies in virtually all major areas of manufacturing, financial institutions, trade associations, labor unions, nonprofit organizations.

Points of special interest included the assurance, by W. F. Ryan, of the U.S. Budget Bureau, that a "wealth" of up-to-date statistics will become available in the early '60s.

W. W. Flexner of the United Nations, in detailing U.N. statistical resources, noted that many seek foreign data that is too specific — to exclusion of sometimes more important general information that reveals the world's economic trends.

Stanley Arasim, Jr., of Atlas Powder spelled out market research techniques, distinguished between the uninspired fact gatherer and the experienced analyst who realizes that a statistical study is no substitute for good judgment.

There was also a pertinent warning from Marshall Ward of Colgate-Palmolive who stressed market research on the consumer level. Such studies, he noted, are often based on consumer dollars; failure to convert to manufacturers' dollars — 55% of the consumer level as a rule of thumb — can lead to serious errors in market analysis.

Use of Data: Many of the problems and pitfalls of interpreting data were detailed at the Philadelphia meeting of the American Marketing Assn.

Among the highlights were methods of correlating company data with general business indicators for forecasts and other projections, without making errors that might result from failure to make seasonal adjustments on data before comparing with, for example, adjusted business indexes.

Labeled as "probably one of the most misleading" methods of dealing with seasonal influences is the common practice of comparing the specific calendar month of one year with the same month a year previously. Such practices, emphasized Leonard Lempert of Statistical Indicator Associates, reveal "absolutely nothing" about the direction in which a business is headed.

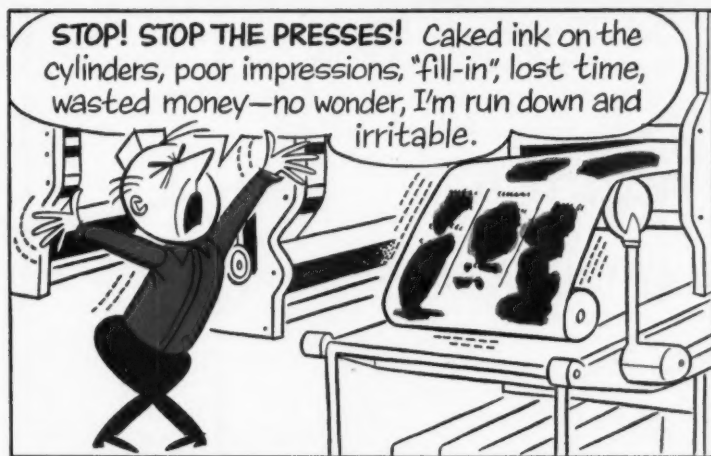
Other speakers said that use of electronic computers is systematizing data evaluation into "a state of rigidity" which, neglecting vital factors, can lead to wrong conclusions.

Clearly, these recent activities of CMRA, AMA, and the Chemists' Club point up the fact that CPI market researchers are working hard to improve statistical sources and data evaluation techniques.



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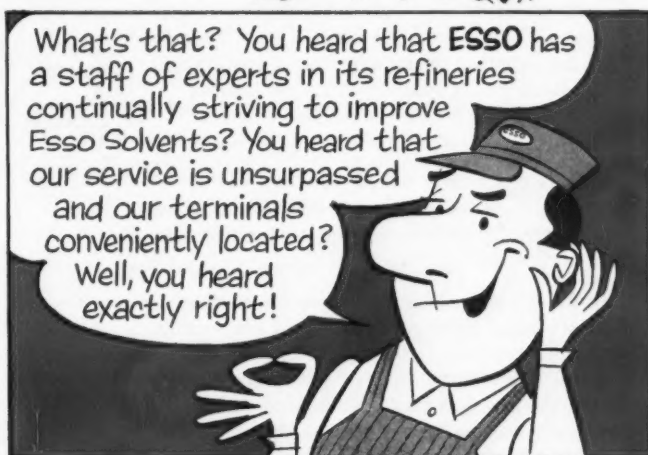
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PRODUCTION USE

May 7, 1960 • Chemical Week

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Soluble Films Brighten PVA Sales Prospects

This fall Borden Chemical Co., division of The Borden Co., will bring onstream a \$1-million, 9-million-lbs./year plant to convert polyvinyl alcohol (PVA) into water-soluble (Lemoflex) resin. The new plant, at Leominster, Mass., will bring Borden's Lemoflex capacity to 12 million lbs./year. If packaging film made from water-soluble PVA fulfills enthusiastic sales forecasts, result will be a lessening of sales problems stemming from current PVA overcapacity.

Current U.S. PVA capacity is rated somewhere around 25 million lbs./year, by year's end may be in excess of 65 million lbs./year. And current production is only 64% of capacity. Moreover, Air Reduction Co. is building a 20-million-lbs./year PVA plant, due onstream soon, which even further complicates the oversupply problem.

Borden, however, hastens to add that expansions might be justified by the sales potential of water-soluble films. These are making headway in the packaging of detergents and soaps, garden chemicals and a variety of premeasured consumer products, may eventually gain acceptance in food packaging.

At present, a CHEMICAL WEEK survey shows, only 7-8% (3 million lbs.) of PVA production goes for water-soluble film use, but the percentage is growing, could be in excess of 15 million lbs. by '65. Borden believes water-soluble film use will reach 12 million lbs./year within three years. If so, the expansion and the time (over five years) and money (\$6 million) invested in development will be fully justified.

All or Nothing: Borden has a new process, too. According to company President Augustine Marusi, "We knew that to stay in the PVA picture, we had to develop a continuous process to replace our batch method. We decided to go all the way with a big new plant, a Borden-engineered process and a market-development program."

About the new process and details of its new resin, Borden says little. The resin, Lemoflex, is internally plasticized, cold-water-soluble, may

have applications in coatings and adhesives, as well as films. It is currently being sold to Reynolds Metals Co. (Richmond, Va.), and Mono-Sol Corp. (Gary, Ind.). These concerns cast a film that is transparent, colorless and permanently flexible.

Film Makers Enthusiastic: E. M. Kratz, Mono-Sol vice-president, is openly enthusiastic about PVA cold-water-soluble film. The company got into the business about four years ago, when the film was first introduced. Says Kratz, "Last year, sales of the film were nominal. This year, the sky's the limit."

Mr. Kratz adds that Mono-Sol is being swamped with orders, is doubling capacity. Reynolds also is ready to expand capacity of its PVA water-soluble film, Reynolon.

According to Kratz, lack of film-casting machinery held back commercialization of cold-water-soluble film. Expensive units, which only recently have become available, had to be developed. Now that machinery has been developed, however, and problems of instability at very low and high relative humidities and temperatures have allegedly been licked, cold-water-soluble PVA film should catch on fast.

Markets Defined: The film will not compete with non-water-soluble films, therefore is no direct threat to polyethylene, polypropylene, cellophane, etc. And since it doesn't yet have Food and Drug Administration approval, it isn't an immediate competitor in the food packaging field.

Main use so far is in soap and detergent packaging and, to a lesser extent, in dye and insecticide packaging. Adell Chemical Co. is buying large quantities of water-soluble film from Mono-Sol and Reynolds to package its Lestair bleach. Adell, until recently, used Dow's methyl cellulose film, Methocel, exclusively.

A major feather in the collective marketing cap of Borden, Reynolds and Mono-Sol would be acceptance of the film by the large soapers, reportedly now test-marketing products packaged in cold-water-soluble film. None are near commercial production yet, but if the experiment works



Polyvinyl alcohol soap package dissolves upon immersion in water, is big sales target of film makers.

out, it could be the spark to send the film on its way. It is especially suited to soap and detergent products because of its soil-suspension properties. PVA in contact with water forms an emulsion, tends to trap dirt in the water, prevent it from redepositing on fabrics.

Another advantage of PVA water-soluble film is its easy heat sealability. (Heat sealing is a problem with some other water-soluble films.) It also offers high gas resistance, excellent oil and grease resistance (some oil companies are experimenting with the film as a possible package for motor oils), long shelf life and can easily be printed with alcohol-type inks.

Overcapacity — and Price Cuts: There is a possibility that worsening overcapacity problems will force a PVA price slice. There was a slight cut a year ago, and some observers feel certain that the added capacity by year's end may cause additional raw-material price cuts. The film resin now sells for 80¢/lb., in large quantities; PVA water-soluble film (which has never had a price cut, expects none) sells for \$1.85/lb., in large lots.

There's some speculation that other film and resin makers will be competing shortly with Reynolds, Mono-Sol and Borden. Kratz doubts this. Reason: high capital investment and a great deal of technical know-how are needed to make quality film. Borden Chemical tends to agree, feels its extensive research and large Lemoflex investment provide a safe lead.

On the other hand, if the PVA cold-water film market is burgeoning, Borden may want to broaden distribution of the resin as much as possible, may encourage other film uses. In addition, the present film makers are certain to want more than one resin supplier. Anticipating this possibility, Borden plans to watch demand closely, build new production and storage facilities if needed.

Competitive Efforts: A number of companies are working on competitive water-soluble-film products. They have plenty of resins to choose from. At present, about 3 billion lbs. of water-soluble resins (mostly starch) are sold by U.S. producers each year. These include carboxymethylcellulose (CMC) made by Du Pont, Hercules Powder and Wyandotte Chemicals; methylcellulose (Methocel) produced

by Dow; hydroxyethylcellulose (Cello-size) and polyethylene oxide (Polyox) made by Union Carbide; and Vinol PVA resins produced by Colton Chemical Co., division of Air Reduction Co. Shawinigan Resins Corp. also is working on resins that will yield a water-soluble film.

Dow's Methocel claims one important advantage over PVA water-soluble films—it has FDA approval for food packaging. And it is also being pushed for detergent and garden fertilizer packaging.

Admittedly, Methocel has some limitations; one is its lack of the water-solubility temperature range of PVA films. Further, production capacity is limited, and no expansion is planned. According to Dow, it isn't going to expand while "a lot of research is going on that could change the product considerably."

Methocel is sold for cold-water-soluble applications at \$1.77/lb. It yields 29,400 sq.in./lb. at 1-mil thickness, but thicknesses of 1½ and 2 mils are used for nearly all applications. Dow has a major research program under way in an effort to develop a suitable hot-water-soluble film, a cheaper film and an extrusion process. The film is cast at present.

Union Carbide, doing extensive research in water-solubles, produces Polyox resins in development quantities for evaluation by potential customers. By year-end, Carbide expects to introduce a competitively priced water-soluble film. The company now has a very active developmental program covering Polyox film uses, sees the water-soluble-film market as a limited specialty market for now, but one that's certain to grow rapidly.

Shawinigan also claims to have a stake, stoutly declares it is working on a resin that will yield a better water-soluble film than any now available. Says the company, which is working with both Reynolds and Mono-Sol, "We don't feel Lemoflex is the whole answer. We're well into the field, but we're working on a better product."

Bright Future: Unquestionably, water-soluble films will gain widespread use in the near future. There are numerous applications ideally suited to their use. It appears that when the big market breakthrough comes, Borden Chemical and film-makers Reynolds and Mono-Sol will have a

leg up on the competition. Chances are, too, that there are likely to be other water-soluble-resin makers (PVA or otherwise) in the picture before there are other water-soluble-film makers.

This much is certain: struck by the obvious potential of water-soluble films and other applications, PVA producers have ignored existing overcapacity, have expanded significantly. And, film makers have followed suit. Their success or failure is wrapped in yet-to-be-fully-accepted PVA water-soluble film.

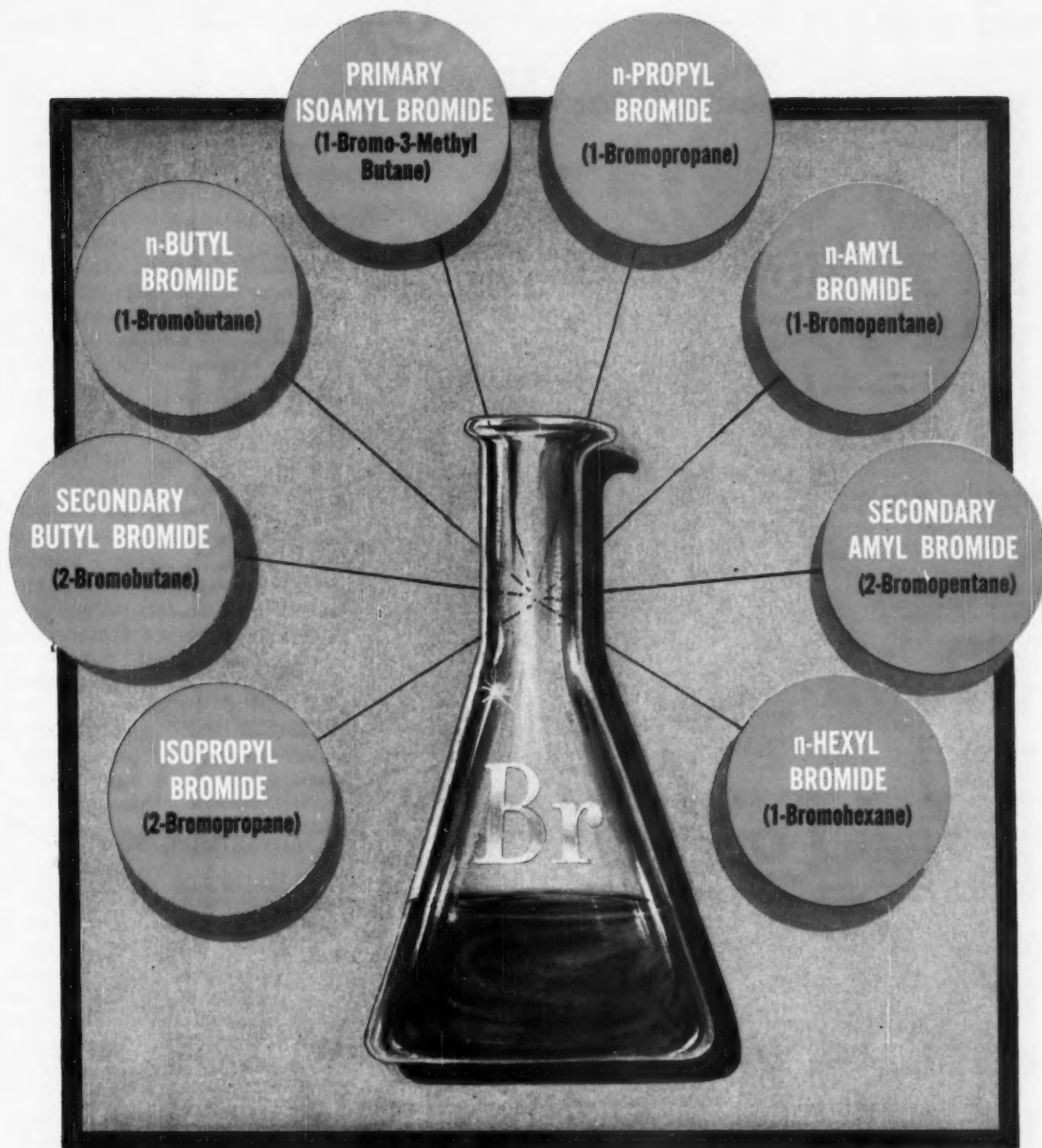
Selling Traffic Aid

Suppliers to the fertilizer industry have new evidence this week that the trade is teeming with opportunities to make transportation and traffic service a major selling tool. The evidence: a new field survey, by International Minerals & Chemical Corp., that shows over 25% of fertilizer makers have a specific transportation or plant-location problem.

The figures come from an IMC field study, made in the past three months, of some 239 fertilizer firms. The company's transportation specialists uncovered 59 traffic problems—most of them easily solved. Somewhat earlier, IMC had found many plant-food makers lacking up-to-date traffic news (on rate decisions, etc.), and to help alert them to shipping and freight-handling matters that might save them money, it recently launched a quarterly transportation newsletter.

Rising Rates: Freight rate increases over recent years have swelled transportation costs to nearly one-third of all fertilizer industry costs. This was a major tip-off to IMC. Eight traffic staff members, including director of transportation Eugene Landis and assistant director Walter Knorst, started up the series of customer visits. They contacted firms with annual sales of \$100,000 to over \$100 million. Their main question: "What is your transportation problem and how can we help?"

Problems involving routing and freight rates were the ones most frequently encountered. In one typical case, IMC found an ammonium sulfate purchaser paying a maximum \$3.68/ton rate because he was taking shipments in freight cars with insufficient capacity to qualify for the spe-



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tracers SECTION

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F. J. Eberle, Business Mgr.

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ADVERTISING STAFF

Atlanta 3 Michael Miller,
1301 Rhodes-Harvery Bldg., Jackson
3-6951

Boston 16 Paul F. McPherson, 350 Park
Square Building, Hubbard 2-7160

Chicago 11 Alfred D. Becker, Jr.,
R. J. Clausen, 620 N. Michigan Ave.,
MOhawk 4-5800

Cleveland 13 H. J. Sweger, Duncan C.
Stephens, 1164 Illuminating Bldg., 56
Public Square, Superior 1-7000

Dallas 1 Gene Holland, Gordon Jones,
The Vaughn Bldg., 1712 Commerce St.,
Riverside 7-5117

Denver 2 J. Patten, 1700 Broadway,
ALpine 5-2981

Detroit 26 H. J. Sweger, Jr., 856
Penobscot Bldg., Woodward 2-1793

Frankfurt/Main Stanley Kimes,
85 Westendstrasse, Germany

Geneva Michael R. Zernel
2 Place du Port, Geneva, Switz.

London E.C. 4 E. E. Schirmer, McGraw-
Hill House, 95 Farringdon St., England

Los Angeles 17 Robert Yocom, 1125
West Sixth St., HUntley 2-5450

New York 36 Charles Haines,
B. A. Johnson, P. E. McPherson, Charles
F. Onasch, L. Charles Todaro, 500 5th
Ave., OXford 5-5959

Philadelphia 3 William B. Hannum, Jr.,
6 Penn Center Plaza, LOcust 8-4830

Pittsburgh 22 Duncan C. Stephens,
Room 1111 Henry W. Oliver Bldg.,
EXpress 1-1814

San Francisco 4 William C. Woolston,
68 Post St., LOUgae 2-4600

St. Louis 8 R. J. Clausen, 2615
Olive St., Continental Bldg. JEFFerson
5-4867

*For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1959-60

SALES

cial \$3.27/ton rate applicable to shipments of 100,000 lbs. or more. The carrier is now attempting to supply larger cars. If they are unavailable, the carrier will make the low rate applicable to the smaller shipment size.

In another example, IMC found a customer reluctant to erect a new plant because it had been quoted an \$8.10/ton rate plus a \$5/ton local charge on phosphate rock. A recheck revealed that the \$5/ton local charge did not apply.

And for a corn-belt customer, IMC computed for each element in two formulas; pounds needed; freight rates by various modes; cost per net ton of product, both from present plant and proposed new site.

Freight service comprised another main problem area. In one instance, a phosphate rock account was hobbled by shipment scheduling difficulties, demurrage charges and overtime payments because rail service was available only on Mondays, Wednesdays and Fridays. By getting the carrier to move some shipments through a second routing point, somewhat further away, that has service on Tuesdays and Thursdays, the customer now gets daily delivery.

More Problems: Rates and service, however, were only two of the key problem areas turned up. IMC also found that many fertilizer firms had serious problems in evaluating the traffic aspects of plant location and warehousing, in negotiating with carriers (e.g., getting rail spurs to new plant sites); in technical traffic assistance (e.g., explanation of regulations); in getting freight cars and barges during shortages; in interpretation of tariffs and in getting action on damage claims.

Much of the difficulty with faulty rates and service, says Landis, can be blamed "on local freight agents who are unfamiliar with the existence of special rates and schedules . . . and on companies that haven't the time or manpower to bring their problems to the carrier."

What IMC's new venture in traffic service will mean in added sales won't be known for a number of months. That's because many of the suggestions tendered by IMC have yet to be acted upon. But it's reasonable to figure that the sales will more than offset the cost of providing the service.

Tracers

TO THE
CHEMICAL
PROCESS
INDUSTRIES

ADDRESS BOX NO. REPLIES TO: Box No. Classified Ad. Div. of this publication.
Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITION WANTED

Wanted—Graduate chemist with two or more years experience in chemical specialties field, aerosol and some bacteriology desirable. Development work, progressive midwest company, name brand products. Send complete resume. P-3961, Chemical Week.

Wanted—Chemist—Research and Development. Excellent opportunity for one with imagination and drive. Must be experienced in formulation of textile and paper processing auxiliaries. Give detailed information and salary requirements in first letter. P-4367, Chemical Week.

Adhesive Resin Chemist—Major adhesive company in Pacific Northwest requires chemist for research and development work in formulation and applications of adhesives and binders for wood products industries. Minimum of 4-5 years experience with phenolic and urea resins for these fields. Must be capable of working into direction of laboratory concentrating in them. Salary commensurate with training, experience and potential. Send resume, recent photo, salary requirements, date of availability in reply. P-4330, Chemical Week.

Technical Service Engineer. BS in chemical engineering or chemistry with 3-5 years experience in the chemical industry. Some travel. Please send resume in confidence, giving education, experience, and approximate salary to: Central Personnel Office, Solvay Process Division Allied Chemical Corporation, P.O. Box 271, Syracuse 1, New York.

Assistant Sales Manager—P.V.C. Resins, compounds. Exceptional opportunity for aggressive producer. High immediate earnings. Unlimited growth potential. Opening is result of increased production facilities. Send detailed resume to: Dr. Albert Fuhrman—Great American Plastics Co., 650 Water St., Fitchburg, Mass.

SELLING OPPORTUNITIES AVAILABLE

Specialty equipment company requires manufacturers representative. Should be in the 35 to 45 age range and presently handling similar accounts. Several territories open. Submit resume to RW-4099, Chemical Week.

Process Equipment Manufacturer requires aggressive representation in Western New York, Northern Pennsylvania. Submit resume to: RW-4307, Chemical Week.

POSITION WANTED

Chemist—MS Eleven years coatings and plastics R & D. Organic and inorganic marine, industrial & oil industry corrosion coatings. Aeronautical, electronics & space systems special purpose coatings, plastics & adhesives. Experience all levels: laboratory, staff, sales & management. Available employment Los Angeles Area or consulting any area. Own Lab. PW-4264, Chemical Week.

Chemical Sales. Broad experience textiles, paper, other segments in industrial chemicals. 20 years plus in South and Southeast. Age 47. No objection to commission if potential justifies. PW-4303, Chemical Week.

Chemist, over 50, last 16 years in plastics R&D, desires management, supervisory, technical service, consulting or R&D position. Prefers West, will consider other locations. Full or part time, salary open. PW-4332, Chemical Week.

American with 10 years abroad now holding responsible chemical sales position with very large foreign company interested in obtaining position with U.S. Chemical Company either export or overseas operations. PW-4323, Chemical Week.

SELLING OPPORTUNITIES WANTED

Manufacturers Representatives selling industrial chemicals in California seeking additional line. RA-4313, Chemical Week.

Process Machinery Manufacturers—Eastern engineering sales agency offers process knowledge and engineering skill to sell, apply, install your products. RA-4349, Chemical Week.

PROFESSIONAL SERVICES

Clark Microanalytical Laboratory—CH. M. S. Halogen, Fluorine, Oxygen, Alkoxyl, Alkamide, Acetyl, Terminal Methyl, etc. by specialist in organic microchemical analysis. P.O. Box 17, Urbana, Ill., Empire 7-8406.

CONTRACT WORK WANTED

Custom Grinding—Ultra Fine or Course—Specialty or Volume Blending and Grinding service on unit or contract basis. Complete CO₂ installation for Nylon, Teflon and Heat Sensitive Materials. A Cramer Corp., 10881 S. Central Avenue, Box 682, Oak Lawn, Illinois.

Spray Drying—Reputable chemical manufacturer has modern spray dryer located in the Southeast available for custom drying, on volume basis, a wide variety of water soluble materials. Will consider drying solutions or slurries furnished by customer on toll basis. Also equipped to manufacture materials suitable for spray drying. If interested reply CWW-4094, Chemical Week.

BUSINESS OPPORTUNITIES

Chicago Bulk Chemical or Petroleum Storage site—River front location—Railroad spurs—Access to tollways—Will build to suit—Send for booklet—Llanah Terminals, Box 89, Lemont, Illinois, Chicago, Blashop 2-3210.

Go Public or Merge! Unusual plan developed by specialists to provide new sources of funds with capital gain advantages, estate tax savings and ready marketability of your assets. Also arrange private financing. BO-4315, Chemical Week.

Our technically trained, fast growing sales company, marketers of unusual organics, seeks chemists, companies or groups that want to start, expand, or sell a plant to manufacture chemicals or related products that can profitably be marketed by dint of our mutual talents, resources, or capital. All replies strictly confidential. BO-4333, Chemical Week.

Chemical, pharmaceutical laboratory is interested in manufacturing pharmaceutical and veterinary specialties under licence in Switzerland. Please apply Box OFA 3159 CH, Orell Fussli-Announces, Zurich/Switzerland.

FOR SALE

Send for Revised Illustrated Circular on our \$3,000,000 chemical plant liquidation at Orange, Texas. All T316 SS equipment including tanks, columns, heat exchangers, filters, centrifugals, pumps, valves, pipe, etc. Perry Equipment Corp., 1415 N. Sixth Street, Philadelphia 22, Pa.

Dark Diethyl Sebacate, Bulk, 324 lb. DBS Plast. Virgin Bulk 35# Barium Hydrox. N. F. (J. T. Baker Orig.) 15 Leverpaks \$0.06/lb. Toluol 10,000 gals. \$20/gal. Isoprene-Enjay virgin 3 drums \$15. Ohio Apex KP23 plasticizer orig. drums \$12/lb. Virgin Neopentyl Glycol-20-100# drums. Trimethylol Propane 20-100# drums. Barrett Pyridine 15A 3 orig. drums \$35/lb. Acetone 10,000 gals. \$45/gal. DDA Plast., Virgin, 20 dms 374/lb. FS-4167 Chem. Wk.

Ammonia Superheater, 98 KW, with 36 heater elements. Also Whitlock Ammonia Steam preheaters, 50 sq. ft. Perry, 1415 N. 6th St., Phila. 22, Pa.

American 36" x 84" Vac. dbl drum dryer, ASME, excellent condition. Perry Equipment Corp., 1415 N. Sixth St., Phila. 22, Pa.

Save money. Prime Isobutanol Available in tank cars or tank trucks. "World Smallest Producer." Mercury Chemical Corp., Edison, N.J. Liberty 8-1540

Tank Trailers for Chemicals Stainless Steel—new and used. Hackett Trade Co., Inc P. O. Box 803, Packers St., Kansas City, Kan. MA 1-2363.

Allyl monomer, low melting solid, low exotherm, low shrinkage, 10,000 lbs. Gives hard, brilliantly transparent, light amber homo-polymer. Unusually suitable for casting, emblems, photoelastic studies, clear, nearly colorless thermoset copolymers. FS-4331, Chemical Week.

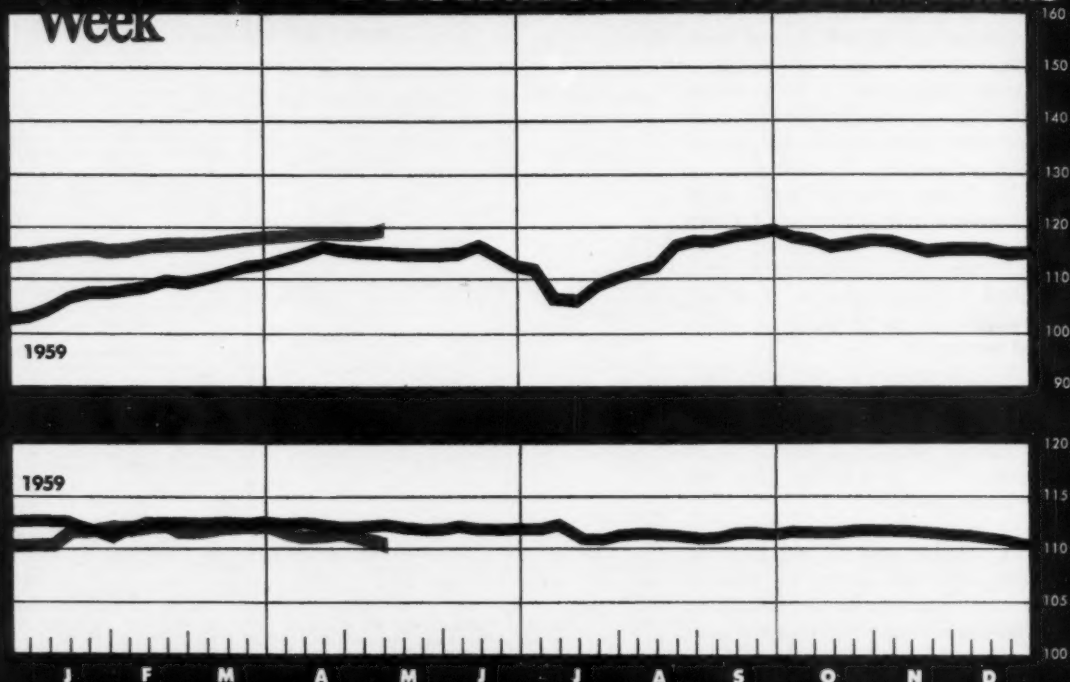
Plasticizer: Lowest prices primary phthalate plasticizer; excellent solvation and efficiency, excellent compatibility with secondary plasticizers. Regularly available in transport trucks or drums. Mercury Chemical Corp., Edison, N.J., Liberty 8-1540.

WANTED

Stainless valves, fittings, flanges, pipe. Buy & sell unused piping, small or large lots. Anchor Co., 240 Holden Seattle 8, Wash.

Any quantity—55 gallon stainless steel drums in good used condition. Standard Barrel & Bag Co. 18640 Mt. Elliott Ave., Detroit 34, Mich.

BUSINESS BENCHMARKS



MAY 7, 1960

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	120.4	119.9	116.9
Chemical Week wholesale price index (1947=100)	109.3	109.9	112.4
Stock price index (12 firms, Standard & Poor's)	50.39	51.48	56.02
Steel ingot output (thousand tons)	2,261	2,238	2,627
Electric power (million kilowatt-hours)	13,213	13,263	12,538
Crude oil and condensate (daily av., thousand bbls.)	6,983	7,032	7,132

MONTHLY INDICATORS

—Trade (million dollars)

All manufacturing	31,550	31,110	28,481
Chemicals and allied products	2,340	2,260	1,930
Petroleum and coal products	3,150	3,080	3,037
Paper and allied products	1,060	1,010	970
Textile products	1,260	1,260	1,140

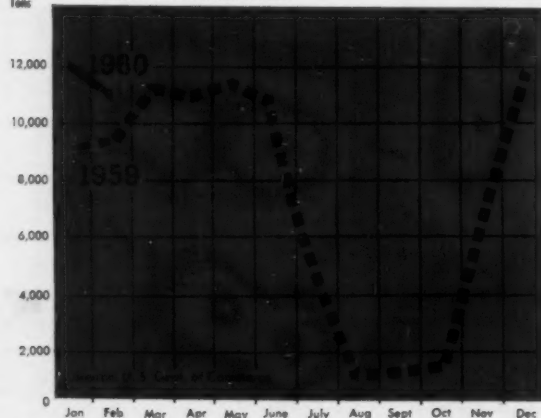
Manufacturers' Sales

Latest Month	Preceding Month	Year Ago
31,550	31,110	28,481
2,340	2,260	1,930
3,150	3,080	3,037
1,060	1,010	970
1,260	1,260	1,140

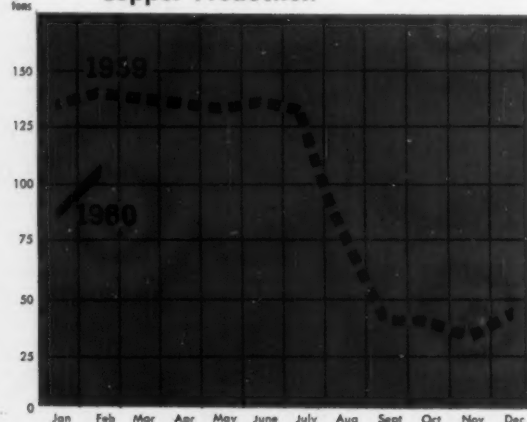
Manufacturers' Inventories

Latest Month	Preceding Month	Year Ago
53,900	53,310	49,921
4,050	4,030	3,727
3,370	3,410	3,307
1,540	1,530	1,452
2,650	2,580	2,457

Steel Production



Copper Production



GULF...AND THE REMARKABLE PROGRESS OF PETROCHEMICALS

IN HOUSING . . . Much of this modern home was miles underground just a few years ago. For chemicals, derived from petroleum, produce its bright colors, make its plastic wind screen strong yet easy to move, provide insulation for its walls and roof, protect its foundation against moisture and cold. And inside the house, plastic tile and counter tops, synthetics in rugs and drapes and wall coverings, insulation for wiring and appliances—all from petrochemicals.

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Benzene • Cyclohexane • Ethylene • Isooctyl Alcohol • Propylene •
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GENERAL CHEMICAL'S NEWEST SULFURIC BARGE



Ready to deliver! The "Genco 9"—General Chemical's newest sulfuric acid barge—goes down the ways.

With the launching of the "Genco 9," General Chemical put its twelfth sulfuric acid barge into service . . . newest addition to the nation's largest fleet operating on coastal and inland waterways.

This unit—with a 1250 ton capacity—is now serving the Pittsburgh area. It adds another important link to General's large and flexible transportation system, which also includes the nation's largest fleets of sulfuric tank cars and tank trucks—all geared to provide reliable, low cost acid delivery service to customers everywhere.

Extensive production facilities. General Chemical now has 21 sulfuric plants,* 15 of which are equipped to handle spent acid. Each is geared to meet regional requirements. In addition, the output of one backs up another—helping assure continuous supply of sulfuric to meet emergencies or unexpected demands.

For specific information on how General can serve your sulfuric acid requirements, write or phone your nearest General Chemical sales office.

*In Canada: The Nichols Chemical Company, Ltd.



GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.



